

H. S. John

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JOURNAL OF

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Vol. 36.

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## CORNUS AMOMUM AND CORNUS CANDIDISSIMA<sup>1</sup>

H. W. RICKETT

THE name *Cornus Amomum* Miller is generally applied to a species of dogwood of the eastern United States, characterized by a rusty-brown silky pubescence of the leaves and twigs, and by blue fruits which contain compressed, longitudinally ridged stones. A closely related species or variety, common in the central states, differs in its somewhat narrower leaves, and in its pubescence, which is of a white or yellowish color; close examination discloses also that the lower surface of the leaves is covered with minute papillae.

In listing the plants of Columbia, Missouri, I was undecided (Univ. Mo. Stud. 6: 57. 1931) what name should be used for the latter form. This led to an examination of the nomenclatural history of *C. Amomum*, with results which may be of general interest.

Miller, in describing *C. Amomum* (Gard. Dict. ed 8. 1768), gave as a synonym the species described by Plukenet (Phyt., tab. 169, fig. 3. 1691) as *Cornus americana sylvestris, domesticae similis, bacca caerulei coloris elegantissima, Amomum Novae-Angliae quorundam*. Later (Almag.: 120. 1696) Plukenet characterized the same species as *Cornus foemina, laurifolia, fructu nigro caeruleo, ossiculo compresso, Virginiana*. In the earlier editions of the Dictionary, Miller used the latter description. In the seventh edition (1759) all the species were rearranged and redescribed; that in question became *Cornus arborea foliis ovatis petiolatis, floribus corymbosis terminalibus*. In the eighth edition the specific epithet (*Amomum*) was inserted.

<sup>1</sup> Published with aid to RHODORA from the National Academy of Sciences.



There is nothing in all this to indicate with certainty which of the blue-fruited species of *Cornus* was actually meant. The descriptions of species, however, are followed, in all editions of the Dictionary, by a general section which deals mainly with the propagation and uses of the dogwoods. In the eighth edition we read: "The shoots of the fifth sort [*C. Amomum*] are of a beautiful red colour in winter; and in summer the leaves being large, of a whitish colour on their under side, and the bunches of white flowers growing at the extremity of every branch, renders this shrub valuable; and in autumn, when the large bunches of blue berries are ripe, they make a fine appearance." Of this Farwell (RHODORA 33: 68. 1931) says "I was puzzled to understand how such a good description of *Cornus stolonifera* could apply to the current understanding of *C. Amomum*." Although I cannot claim an acquaintance with *Cornus* comparable with that of this author, I was myself puzzled that a description involving blue fruits should be considered so readily applicable to *C. stolonifera*.<sup>1</sup> In fact, the above description seems to make matters worse in attempting to interpret *C. Amomum*.

A study of the earlier editions of the Dictionary obviates the necessity for this confusion. The sentence quoted appears first in the sixth edition (1752), differing only in that it begins: "The shoots of the sixth sort are of a beautiful red colour . . ." The species so numbered is not *C. Amomum* but *Cornus foemina*, *candidissimis foliis*, *Americana* (*C. candidissima* of ed. 8). In the seventh edition the species were renumbered, and the sentence in question was transferred from one species to another (curiously enough, no change was necessary in the wording of this particular observation, for the species to which it referred retained the same number). We may conclude that the transfer was an accident, which might easily pass unnoticed in a work of the scope of the Dictionary. The eighth edition, as far as concerns *Cornus*, was a reprint of the seventh, with the insertion of specific epithets. It is possible, therefore, to disregard the offending sentence in interpreting *C. Amomum*. It is perhaps worthy of note that in the sixth abridged edition of the Dictionary (1771), the epithet *Amomum* was applied to *C. alba* L., the "wild Tartarian dogwood," which goes to show that Miller was not incapable of such slips in compiling the successive editions of his great work.

As Farwell says, specimens which would authenticate the older

<sup>1</sup> I am indebted to Dr. Fernald for confirming my supposition that the fruits of *C. stolonifera* are regularly white; with at most a slight tinge of violet around the base.

descriptions of *C. Amomum* are unfortunately not to be found. Since the descriptions themselves are inadequate to fix its identity, we may perhaps rely on the usage of Miller's time. Lamarck (Encycl. 2: 116. 1786) was apparently the first to describe in unmistakable terms the rusty-pubescent species known today as *C. Amomum*. He named it *C. caerulea*, quoting the description by Plukenet used by Miller as a basis for *C. Amomum*. L'Héritier, who described it (Cornus: 5. 1788) under the name *C. sericea* L., Ehrhart, who named it *C. rubiginosa* (Beitr. 4: 15. 1789), and Moench, who called it *C. cyanocarpus* (Meth.: 108. 1794<sup>1</sup>), cited *C. Amomum* as a synonym. Pursh treated it (Fl. Amer. Sept. 1: 108. 1814) as *C. sericea* Willd., identifying it with the above names and with *C. alba* Walt. His specimen in the Hooker herbarium at Kew, labeled *C. alba*, is our *C. Amomum*. The older collectors represented in the Hooker herbarium mostly designated this species as *C. sericea* L.; I have seen no specimen of any other species labeled *C. Amomum*.

The best procedure is therefore to let *C. Amomum* Mill. stand in the sense in which it has been almost universally used, excluding the reference to red shoots, white leaves, etc. The probability that Miller's species was actually that which is so designated today is increased by the existence in the Linnaean herbarium of a specimen of *C. Amomum* as currently understood, and so labeled (not, however, in Linné's hand).<sup>2</sup>

The name *Cornus sericea* L. has had a chequered career. The original description (Linn. Mant. 2: 199. 1771) agrees well with *C. stolonifera* Michx., except for the reference to Plukenet and the color of the fruit ("simillima *C. sanguineae* et *albae*, ut difficile distingatur, sed *Baccae* atro-purpureae"). The specimen, moreover, in the Linnaean herbarium is, as Farwell discovered, and as Gray noted on the sheet itself, *C. stolonifera* Michx. Linné was perhaps working from the dried specimen only, and wrongly identified it with Plukenet's blue-fruited species. Murray (Syst. Veg. ed. 13: 134. 1774) excluded the synonym and interpreted it in accordance with the specimen. Willdenow, however (Sp. Pl. ed. 4: 663. 1798) took the other course, and

<sup>1</sup> Moench published *C. cyanocarpus* in an earlier work (Verzeichn.: 26. 1785), but without adequate description, and in addition to *C. Amomum* Mill. In the later publication he united both these under the former name.

<sup>2</sup> If *C. Amomum* is rejected as a nomen dubium, or applied to another species, the legitimate name of the species now so designated is *C. caerulea* Lam. Moench's previous *C. cyanocarpus* (besides being somewhat ambiguous) cannot be adopted, since in this publication he did not use the binomial system consistently (see Rep't. Bot. Exch. Club 10: 305. 1933).



identified it with *C. Amomum* Mill. and *C. rubiginosa* Ehrh. Most collectors seem to have followed Willdenow in this, and since this name, which might otherwise be applied to *C. stolonifera* Michx., has come to be very generally regarded as a synonym of *C. Amomum* Mill., I propose that *C. sericea* L. be included in the list of nomina ambigua.

For the related form with whitish pubescence and narrower, micro-papillose leaves, the earliest specific name seems to be *C. Purpusi* Koehne (Gartenfl. 48: 338. 1899). Certain collectors have recently taken up *C. obliqua* Raf. (West. Rev. 1: 229. 1819<sup>1</sup>). The description of the latter is of a shrub with leaves yellowish-glaucous beneath, quite smooth on both surfaces, and oblique at the base; the berries blueish white. The glabrous leaves and pale fruits do not agree well with *C. Purpusi* Koehne, but suggest rather *C. stricta* Lam. The obliquity of the leaves at the base is a very variable character, and occurs in several species. *C. obliqua* Raf. must therefore share the fate of many species of *Cornus* which he proposed (Alsogr.: 58 et seq. 1838) differentiated chiefly by leaf and twig characters. Wangerin (Engl. Pflanzenr. 4, 229: 91. 1910) lists several of these as nomina dubia. It is noteworthy that *C. obliqua* was not maintained by Rafinesque himself in the Alsographia.

In any case, it is questionable whether this form should be treated as a distinct species. I have seen specimens from Texas and Oklahoma which resemble *C. Amomum* in pubescence but *C. Purpusi* in leaf shape and in the presence of papillae. Many specimens of the latter show a tendency toward a rusty pubescence, especially on the veins and buds; this is a rather variable character in several species. Leaf characters are notably unstable in *Cornus*. It seems preferable, therefore, to treat *C. Purpusi* as a variety of *C. Amomum*. The first varietal epithet is that of Meyer (Mem. Acad. Imp. Sci. St. Petersburg. 6. 1845), who described it as *C. sericea* L.  $\gamma$  *Schuetzeana*.<sup>2</sup>

The descriptive matter excluded from the interpretation of *C. Amomum* may throw some light on the identity of *C. candidissima* Mill., to which it was originally applied. Systematists have been generally undecided whether this was the species currently known as *C. racemosa* Lam. (*C. paniculata* L'Hér.), or the more southern *C. stricta* Lam. Coulter and Evans (Bot. Gaz. 15: 88. 1890), united

<sup>1</sup> In the Index Kewensis the name *C. obliqua* Raf. is referred to Ann. Nat.: 13 (1820). This, however, is not the place of first publication; nor is it as full a description as the earlier one.

<sup>2</sup> Var. *albescens* Farwell, l. c.: 70, thus being superfluous.

them under the name *C. candidissima* Marsh. Wangerin (l. c.: 57) treats them as *C. femina* Mill. Most collectors of today seem to have little difficulty in separating the two, and the intergradations may be due to hybridization. Farwell (l. c.: 71) argues that *C. candidissima* Mill. is *C. paniculata* L'Hér.

The species was founded on Plukenet's *Cornus foemina, candidissimis foliis, Americana* (Almag.: 120. 1696), and appeared first in the sixth edition of the Dictionary (1752). In the seventh edition it became *Cornus arborea foliis lanceolatis, acutis, glabris, umbellis involucri minoribus, baccis ovatis*.

Gronovius (Fl. Virg.: 17. 1739) described a *Cornus foemina, floribus candidissimis umbellatim dispositis, baccis caeruleo-viridibus, ossiculo duro compresso biloculari*, and quoted as synonym Plukenet's species identified by Miller with *C. candidissima*. Clayton's specimen (No. 23), upon which this species is based, is in the herbarium of the British Museum. It consists of several well-preserved flowering shoots of *C. stricta* Lam., with leaves pale and glabrous beneath, sparingly pubescent above, and twigs of a deep red color. If we take into consideration Miller's and Gronovius' citations from Plukenet, this constitutes about as good evidence as can be expected that *C. candidissima* Mill. is the same as *C. stricta* Lam. This interpretation is supported by the sentence referring to its red shoots and blue fruits, which are characters more applicable to *C. stricta* than to *C. racemosa*. Certainly if *C. stricta* and *C. racemosa* are treated as one species, *C. candidissima* Mill. is the best name for it, since it can be thus associated with a definite specimen.

Farwell discusses, and dismisses as of no significance, the troublesome *umbellis involucri minoribus* of Miller's description. It is interesting to notice that on Clayton's specimen appears *Cornus arborea, umbellis involucri destitutis, periantho minimo*. Is it possible that Miller saw this specimen or a duplicate of it, or that the descriptive phrase was communicated to him, and that *destitutis* somehow became *minoribus*? On the sheet also is written "Flowers of a Shrub called here Swamp Dogwood." It may be significant that Miller used the same common name for his *C. candidissima*.

Whether or not *C. foemina* Mill. can be interpreted as *C. racemosa* Lam. (*C. paniculata* L'Hér.) is a matter of opinion apparently unsupported by critical descriptions or specimens.

My understanding of the species discussed above may be summarized as follows:



C. AMOMUM Mill., Gard. Dict. (1768); *C. caerulea* Lam., Encycl. 2: 116 (1786); *C. rubiginosa* Ehrh., Beitr. 4: 15 (1789); *C. cyanocarpus* Moench, Meth.: 108 (1794); *C. sericea* Willd., Sp. Pl. ed. 4: 663 (1798).

C. AMOMUM Mill. var. **Schuetzeana** (Meyer), comb. nov.; *C. sericea* L. γ *Schuetzeana* Meyer in Mem. Acad. Imp. Sci. St. Petersburg. 6 (1845); *C. cyanocarpus* Moench var. *albescens* Farwell in RHODORA 33: 70 (1931); *C. Purpusi* Koehne in Gartenfl. 48: 338 (1899).

C. CANDIDISSIMA Mill., l. c.; *C. stricta* Lam., l. c.

This study was made possible by the courtesy of many persons connected with the herbarium of the Royal Botanic Gardens, Kew, with the herbarium of the British Museum (Natural History), and with the Linnaean herbarium in Burlington House, Piccadilly; also by a leave of absence granted by the University of Missouri.

DEPARTMENT OF BOTANY,  
UNIVERSITY OF MISSOURI

## PLANTS COLLECTED IN THE SOUTHERN REGION OF JAMES BAY<sup>1</sup>

DAVID POTTER

THE following list of plants collected by the writer during the summer of 1929 is published with the hope that not only will it furnish additional information concerning the geographical ranges of the plants herein enumerated, but also will serve as an aid to anyone who, at a later date, may explore for plants in this general region.

Certain interesting phytogeographical problems suggested by the occurrence of some of the plants listed have already been discussed by the writer.<sup>2</sup>

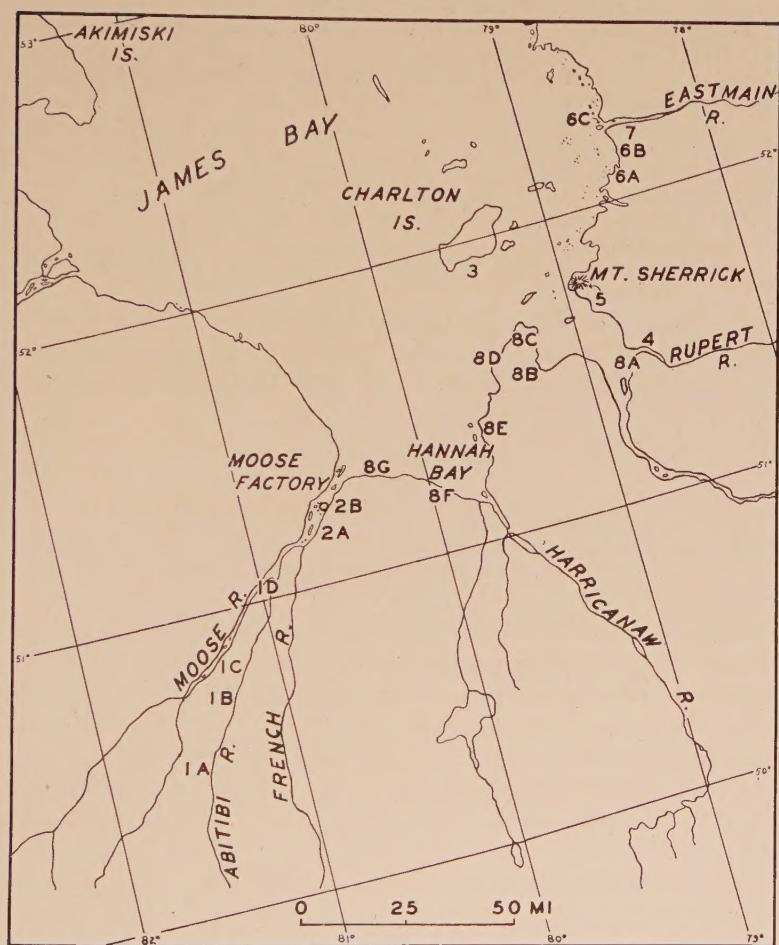
The general regions botanized are indicated by Arabic numerals and the approximate collecting points are shown on the accompanying map by the same legend plus the letters as indicated in the following key.

1. ABITIBI RIVER:—from Coral Rapids to its mouth.
  - A. LONG RAPIDS
  - B. BLACKSTONE RAPIDS
  - C. NINE MILE RAPIDS
  - D. ALLEN ISLAND, at the mouth of the river.
2. MOOSE RIVER:—from the mouth of the Abitibi River to the mouth of the Moose River.

<sup>1</sup> Published with aid to RHODORA from the National Academy of Sciences.

<sup>2</sup> Potter, David, Botanical Evidence of Post-Pleistocene Marine Connection Between Hudson Bay and the St. Lawrence Basin. Contributions from the Gray Herbarium of Harvard University, XCIX. (RHODORA, 34, May and June, 1932.)





- A. Near the mouth of the Abitibi River.
- B. Many islands near the mouth of the Moose River including Moose, Saw Pit, Bushy, Willowy and Hasey.
3. CHARLTON ISLAND:—along the coast five miles southeast and three miles northwest of the Hudson Bay Post and two miles inland.
4. RUPERT RIVER:—from its mouth to two miles above the Hudson Bay Post.
5. MT. SHERRICK:—from the coast to the top of the mountain, altitude 700 feet.
6. EAST COAST:—from Mt. Sherrick to the mouth of the Eastmain River.
  - A. Ten miles south of the mouth of the Eastmain River.
  - B. Nine miles south of the mouth of the Eastmain River.
  - C. DILLY DALLY ISLAND.

7. EASTMAIN RIVER:—from its mouth to two miles above the Hudson Bay Post.
8. SOUTH COAST:—from the mouth of the Rupert River to the mouth of the Moose River.
- A. MIDDLETON ISLAND.
- B. CABBAGE WILLOWS.
- C. POINT COMFORT.
- D. 15 miles west of Point Comfort.
- E. TWIN ISLANDS.
- F. HANNAH BAY.
- G. Approximately half way between Hannah Bay and the mouth of Moose River.

The plants are listed by families following the system used in Gray's Manual of Botany, seventh edition. In all cases a mounted specimen has been deposited in the Gray Herbarium of Harvard University.

	1	2	3	4	5	6	7	8
<b>POLYPODIACEAE</b>								
THELYPTERIS DRYOPTERIS (L.) Slosson.....				×				
SPINULOSA (O. F. Müller) Nieuwl.....				×			×	
SPINULOSA, var. AMERICANA (Fisch.) Weatherby.....					×			
PTERETIS NODULOSA (Michx.) Nieuwl.....	×	×						
<b>OPHIOGLOSSACEAE</b>								
BOTRYCHUM LUNARIA (L.) Sw.....			×					
<b>EQUISETACEAE</b>								
EQUISETUM ARVENSE L.....	×	×	×	×	×	×	×	
PALUSTRE L.....	×	×						
VARIEGATUM Schleich.....		×				×		
SCIRPOIDES Michx.....	×							
LIMOSUM L.....	×	×					×	
<b>LYCOPODIACEAE</b>								
LYCOPodium SELAGO L.....					×			
LUCIDULUM Michx.....							×	
OBSCURUM L., var. DENDROIDEUM (Michx. D. C. Eaton.....					×			
ANNOTINUM L.....	×				×			
ANNOTINUM, var. PUNGENS Desv.....					×		×	
CLAVATUM L., var. MEGASTACHYON Fern. and Biss.....					×			
COMPLANATUM L.....						×	×	
<b>SELAGINELLACEAE</b>								
SELAGINELLA SELAGINOIDES (L.) Link.....			×					
<b>PINACEAE</b>								
PINUS BANKSIANA Lamb.....					×			
LARIX LARICINA (DuRoi) Koch.....	×		×	×	×			
PICEA GLAUCA (Moench) Voss.....		×	×	×				
MARIANA (Mill.) BSP.....					×			



	1	2	3	4	5	6	7	8
<b>PINACEAE—(Continued)</b>								
ABIES BALSAMEA (L.) Mill. ....		x		x				
THUJA OCCIDENTALIS L. ....	x	x						
JUNIPERUS COMMUNIS L., var. DEPRESSA Pursh. ....					x			
COMMUNIS, var. MONTANA Ait. ....			x		x		x	
HORIZONTALIS Moench. ....								x
<b>TYPHACEAE</b>								
TYPHA LATIFOLIA L. ....								x
<b>SPARGANIACEAE</b>								
SPARGANIUM ANGUSTIFOLIUM Michx. ....								x
<b>NAJADACEAE</b>								
POTAMOGETON FILIFORMIS Pers., var. MACOUNII Morong. ....			x					
FILIFORMIS Pers. var. BOREALIS (Raf.) St. John. ....						x		x
ZANNICHELLIA PALUSTRIS L. var. MAJOR (Boenningh.) Koch. ....								x
<b>JUNCAGINACEAE</b>								
TRIGLOCHIN MARITIMA L. ....			x	x	x	x	x	x
PALUSTRIS L. ....								x
<b>ALISMACEAE</b>								
SAGITTARIA CUNEATA Sheldon. ....		x						x
<b>GRAMINEAE</b>								
HIEROCHLOE ODORATA (L.) Wahlenb. ....	x	x	x			x		
ORYZOPSIS PUNGENS (Torr.) Hitchc. ....			x		x			
CANADENSIS (Poir.) Torr. ....							x	
PHLEUM PRATENSE L. ....				x				
AGROSTIS STOLONIFERA L. ( <i>A. alba</i> of authors) ....		x						
CALAMAGROSTIS CANADENSIS (Michx.) Nutt., var. ROBUSTA Vasey. ....					x		x	
NEGLECTA (Ehrh.) Gaertn., Meyer & Scherb. ....						x		x
INEXPANSA Gray, var. AMERICANA (Vasey) Stebbins. ....			x					
DESCHAMPSIA CESPITOSA (L.) Beauv., var. GLAUCA (Hartm.) Lindm. ....	x	x						
CESPITOSA, var. LITTORALIS (Reut.) Richter. ....	x	x		x				x
POA PRATENSIS L. ....		x	x	x			x	x
EMINENS J. S. Presl. ....					x			
ALPINA L. ....			x	x				
ALPINA, var. BREVIFOLIA Gaudin. ....							x	
ANNUA L. ....							x	
GLAUCA Vahl. ....								x
NEMORALIS L. ....	x			x		x		
PALUSTRIS L. ....		x		x				
GLYCERIA STRIATA (Lam.) Hitchc., var. STRICTA (Scribn.) Fernald. ....				x				
FESTUCA RUBRA L. ....		x	x	x		x		x
RUBRA, var. ARENARIA (Osbeck) Fries. ....					x		x	x
RUBRA, var. MEGASTACHYS Gaudin. ....								x

	1	2	3	4	5	6	7	8
GRAMINEAE—(Continued)								
HORDEUM JUBATUM L.....				x				x
ELYMUS ARENARIUS L., var. VILLOSUM E. Meyer.....			x		x			x
CYPERACEAE								
ELEOCHARIS PALUSTRIS (L.) R. & S., var. TYPICA Rouy.....				x		x	x	x
UNIGLUMIS (Roth) R. & S.....			x			x		
PAUCIFLORA Lightf.....						x		
CALVA Torr.....	x	x		x				x
SCIRPUS CESPITOSUS L., var. CALLOSUS Bigelow.....					x			
HUDSONIANUS (Michx.) Fernald.....					x			
RUFUS (Huds.) Schrad.....		x	x				x	
AMERICANUS Pers.....		x						
VALIDUS Vahl.....		x						x
RUBROTINCTUS Fernald.....		x						
ERIOPHORUM CHAMISSONIS C. A. Meyer.....					x	x		
OPACUM (Bjornstr.) Fernald.....	x							
SPISSUM Fernald.....					x			
VIRIDI-CARINATUM (Engelm.) Fernald.....				x				
CAREX CRAWFORDII Fernald.....				x				
EXILIS Dewey.....					x			
ANGUSTIOR Mackenz.....							x	
CANESCENS L.....				x				
CANESCENS, var. SUBLOLIACEA Laestad.....		x					x	
BRUNNESCENS Poir.....				x	x			
BRUNNESCENS, var. SPHAEROSTACHYA (Tuck.) Kukenth.....				x			x	
TRISPERMA Dewey.....				x				
NORVEGICA Willd.....								x
GLAREOSA Wahlenb., var. AMPHIGENA Fernald.....					x	x		
DISPERMA Dewey.....	x							
CHORDORHIZA L. f.....								x
CAPITATA L.....					x	x		
PALEACEA Wahlenb., var. TRANSANTICA Fer- nald ( <i>C. maritima</i> of Am. authors).....		x	x	x	x	x	x	x
SALINA Wahlenb., var. KATTEGATENSIS (Fries) Almq.....			x			x		
AQUATILIS Wahlenb.....	x		x	x	x			
HAYDENI Dew.....	x							
AUREA Nutt.....								x
PAUCIFLORA Lightf.....				x				
LEPTALEA Wahlenb.....		x			x			
LIVIDA (Wahlenb.) Willd., var. GRAYANA (Dew- ey) Fernald.....					x			
VAGINATA Tausch.....		x	x					
PAUPERCULA Michx.....				x				
LIMOSA L.....					x			
RARIFLORA Smith.....						x		
EBURNEA Boott.....		x						
CONCINNA R. Br.....		x	x			x		
CAPILLARIS L.....		x			x			x
HOUGHTONII Torr.....		x				x		
SAXATILIS L., var. MILIARIS (Michx.) Bailey.....						x		x
SAXATILIS, var. RHOMALEA Fernald.....						x		
ROSTRATA Stokes.....			x					x
MICROGLOCHIN Wahlenb.....						x		

AT/



Owing to defects in the printing of pages 279 and 280 in the August issue of the RHODORA, these two pages have been reprinted. Cut out the defective pages and insert these in their place.





	1	2	3	4	5	6	7	8
<b>JUNCACEAE</b>								
JUNCUS GERARDI Loisel.....								×
DUDLEYI Wiegand.....		×						
BALTICUS Willd., var. LITTORALIS Engelm.....	×				×		×	×
FILIFORMIS L.....				×			×	
ALPINUS Vill.....							×	
LUZULA PARVIFLORA (Ehrh.) Desv.....				×			×	
<b>LILIACEAE</b>								
TOFIELDIA GLUTINOSA (Michx.) Pers.....						×		
ALLIUM SCHOENOPRASUM L., var. SIBIRICUM (L.) Hartm.....						×	×	
LILIUM PHILADELPHICUM L., var. ANDINUM (Nutt.) Ker.....		×						
CLINTONIA BOREALIS (Ait.) Raf.....	×				×			
SMILACINA STELLATA (L.) Desf.....	×	×	×					×
TRIFOLIA (L.) Desf.....				×	×		×	
STREPTOPUS AMPLEXIFOLIUS (L.) DC.....				×				
ROSEUS Michx.....		×						
<b>IRIDACEAE</b>								
IRIS VERSICOLOR L.....			×	×	×		×	×
<b>ORCHIDACEAE</b>								
CYPRIPEDIUM PARVIFLORUM Salisb.....	×	×						
HABENARIA VIRIDIS (L.) R. Br., var. BRACTEATA (Muhl.) Gray.....		×						×
VIRIDIS, var. INTERJECTA Fern.....	×							
HYPERBOREA (L.) R. Br.....		×	×					×
DILATATA (Pursh) Gray, var. MEDIA (Rydb.) Ames.....				×				
OBTUSATA (Pursh) Richards.....		×	×			×		
LISTERA CORDATA (L.) R. Br.....			×					
CALYPSO BULBOSA (L.) Oakes.....	×		×					
<b>SALICACEAE</b>								
SALIX LUCIDA Muhl., var. ANGUSTIFOLIA Anders.....		×						
LONGIFOLIA Muhl.....	×	×						
GLAUCOPHYLLOIDES Fernald.....		×	×					
MYRTILLIFOLIA Anders.....			×					
ADENOPHYLLA Hook.....		×						
DISCOLOR Muhl.....				×				
BEBBIANA Sargent.....	×	×					×	
CANDIDA Flüge.....		×				×	×	
CANDIDA, var. DENUDATA And.....		×						×
PLANIFOLIA Pursh.....						×		
HUMILIS Marsh., var. KEWEENAWENSIS Farwell.....							×	
PEDICELLARIS Pursh, var. HYPOGLAUCA Fernald.....				×			×	
BRACHYCARPA Nutt.....			×		×	×		×
CORDIFOLIA Pursh, var. CALLICARPAEA (Trautv.) Fernald.....						×		×
LUTEA Nutt.....		×						
CORDATA Muhl.....		×						
POPULUS TREMULOIDES Michx.....			×				×	
TACAMAHACCA Miller.....	×	×	×			×		×
TACAMAHACCA, var. MICHAUXI (Dode) Farwell.....		×						

	1	2	3	4	5	6	7	8
GRAMINEAE—(Continued)								
HORDEUM JUBATUM L.				×				×
ELYMUS ARENARIUS L., var. VILLOSUS E. Meyer.			×		×			×
CYPERACEAE								
ELEOCHARIS PALUSTRIS (L.) R. & S., var. TYPICA Rouy.				×		×	×	×
UNIGLUMIS (Roth) R. & S.			×			×		
PAUCIFLORA Lightf.						×		
CALVA Torr.	×	×		×				×
SCIRPUS CESPITOSUS L., var. CALLOSUS Bigelow.					×			
HUDSONIANUS (Michx.) Fernald.					×			
RUFUS (Huds.) Schrad.		×	×				×	
AMERICANUS Pers.		×	×					
VALIDUS Vahl.								×
RUBROTINCTUS Fernald.		×						
ERIOPHORUM CHAMISSONIS C. A. Meyer.					×	×		
OPACUM (Bjornstr.) Fernald.	×							
SPISSUM Fernald.					×			
VIRIDI-CARINATUM (Engelm.) Fernald.				×				
CAREX CRAWFORDII Fernald.				×				
EXILIS Dewey					×			
ANGUSTIOR Mackenz.							×	
CANESCENS L.				×				
CANESCENS, var. SUBLOLIACEA Laestad.		×					×	
BRUNNESCENS Poir.				×	×			
BRUNNESCENS, var. SPHAEROSTACHYA (Tuck.) Kuentz.				×			×	
TRISPERMA Dewey				×				
NORVEGICA Willd.					×			
GLAREOSA Wahlenb., var. AMPHIGENA Fernald.					×	×		×
DISPERMA Dewey	×							
CHORDORHIZA L. f.								×
CAPITATA L.					×	×		
PALEACEA Wahlenb., var. TRANSLANTICA Fernald (C. maritima of Am. authors).		×	×	×	×	×	×	×
SALINA Wahlenb., var. KATTEGATENSIS (Fries) Almq.		×				×		
AQUATILIS Wahlenb.	×		×	×	×			
HAYDENI Dew.	×							
AUREA Nutt.								×
PAUCIFLORA Lightf.				×				
LEPTALEA Wahlenb.		×			×			
LIVIDA (Wahlenb.) Willd., var. GRAYANA (Dewey) Fernald.					×			
VAGINATA Tausch		×	×					
PAUPERCULA Michx.				×				
LIMOSA L.					×			
RARIFLORA Smith						×		
EBURNEA Boott.		×						
CONCINNA R. Br.		×	×			×		
CAPILLARIS L.		×			×	×		×
HOUGHTONII Torr.		×						
SAXATILIS L., var. MILIARIS (Michx.) Bailey.						×		×
SAXATILIS, var. RHOMALEA Fernald.						×		
ROSTRATA Stokes.			×					×
MICROGLOCHIN Wahlenb.						×		



	1	2	3	4	5	6	7	8
<b>JUNCACEAE</b>								
JUNCUS GERARDI Loisel.								×
DUDLEYI Wiegand.								×
BALTICUS Willd., var. LITTORALIS Engelm.	>				>		×	×
FILIFORMIS L.							×	×
ALPINUS Vill.				/			×	×
LUZULA PARVIFLORA (Ehrh.) Desv.			×				×	
<b>LILIACEAE</b>								
TOFIELDIA GLUTINOSA (Michx.) Pers.						×		
ALLIUM SCHOENOPRASUM L., var. SIBIRICUM (L.) Hartm.						×	>	
LILIUM PHILADELPHICUM L., var. ANDINUM (Nutt.) Ker.		×						
CLINTONIA BOREALIS (Ait.) Raf.	×				×			
SMILACINA STELLATA (L.) Desf.	×	>	×					×
TRIFOLIA (L.) Desf.					×		×	
STREPTOPUS AMPLEXIFOLIUS (L.) DC.				×				
ROSEUS Michx.		×						
<b>IRIDACEAE</b>								
IRIS VERSICOLOR L.			×	>	×		×	×
<b>ORCHIDACEAE</b>								
CYPRIPEDIUM PARVIFLORUM Salisb.	×							
HABENARIA VIRIDIS (L.) R. Br., var. BRACTEATA (Muhl.) Gray		×					×	
VIRIDIS, var. INTERJECTA Fern.	×							
HYPERBOREA (L.) R. Br.		×	×				×	
DILATATA (Pursh) Gray, var. MEDIA (Rydb.) Ames.				×				
OBTUSATA (Pursh) Richards.		×	×			×		
LISTERA CORDATA (L.) R. Br.			×					
CALYPSO BULBOSA (L.) Oakes.	×		×					
<b>SALICACEAE</b>								
SALIX LUCIDA Muhl., var. ANGUSTIFOLIA Anders.		×						
LONGIFOLIA Muhl.	×	×						
GLAUCOPHYLLOIDES Fernald.		×	×					
MYRTILLIFOLIA Anders.			×					
ADENOPHYLLA Hook.		×						
DISCOLOR Muhl.				×				
BEBBIANA Sargent.	×	×					×	
CANDIDA Flügge.			×			×	×	
CANDIDA, var. DENUDATA And.		×						×
PLANIFOLIA Pursh.						×		
HUMILIS Marsh., var. KEWEENAWENSIS Farwell.							×	
PEDICELLARIS Pursh, var. HYPOGLAUCA Fernald.					×		×	
BRACHYCARPA Nutt.			×					×
CORDIFOLIA Pursh, var. CALLICARPAEA (Trautv.) Fernald.						×		×
LUTEA Nutt.		×						
CORDATA Muhl.		×						
POPULUS TREMULOIDES Michx.			×				×	
TACAMAHACCA Miller.	×	×	×			>		×
TACAMAHACCA, var. MICHAUXI (Dode) Farwell.		×						

	1	2	3	4	5	6	7	8
<b>MYRICACEAE</b>								
MYRICA GALE L.			x		x	x		x
<b>BETULACEAE</b>								
BETULA PAPIRIFERA Marsh.		x						
PAPIRIFERA, var. CORDIFOLIA Regel.				x	x			
PAPIRIFERA, var. MINOR Tuckerm.		x						
GLANDULOSA Michx.			x					
MICROPHYLLA Bunge.				x				
ALNUS CRISPA (Ait.) Pursh.	x						x	
INCANA (L.) Moench.		x		x			x	
<b>URTICACEAE</b>								
URTICA GRACILIS Ait.				x			x	
<b>SANTALACEAE</b>								
GEOCAULON LIVIDUM (Richardson) Fernald (Comandra livida Richards.)			x		x		x	
<b>POLYGONACEAE</b>								
RUMEX OCCIDENTALIS Wats.			x	x			x	
MEXICANUS Meisn.						x		
ACETOSELLA L.				x				
POLYGONUM AVICULARE L.				x				x
VIVIPARUM L.		x					x	
CONVOLVULUS L.				x				
<b>CHENOPODIACEAE</b>								
CHENOPODIUM ALBUM L.				x				
ATRIPLEX PATULA L.								x
<b>CARYOPHYLLACEAE</b>								
ARENARIA LATERIFLORA L.			x		x			x
PEPLOIDES L.			x		x			x
STELLARIA BOREALIS Bigel.			x					
CRASSIFOLIA Ehrh.								x
LONGIPES Goldie, var. LAETA (Richards.) Wats.			x			x	x	x
LONGIFOLIA Muhl.		x		x			x	
MEDIA (L.) Cyrill.				x				
CERASTIUM ARVENSE L.						x	x	x
VULGATUM L.		x						
ALPINUM L.			x					
<b>NYMPHAEACEAE</b>								
NYMPHOZANTHUS VARIEGATUS (Engelm.) Fernald.					x			
<b>RANUNCULACEAE</b>								
RANUNCULUS AQUATILIS L., var. CAPILLACEUS DC.								x
CYMBALARIA Pursh.				x	x	x	x	x
PURSHII Richards.							x	
ABORTIVUS L.				x				
THALICTRUM CONFINE Fernald.	x	x					x	x
POLYGAMUM Muhl.		x						
VENULOSUM Trelease.			x					
ANEMONE PARVIFLORA Michx.	x					x		

	1	2	3	4	5	6	7	8
<b>RANUNCULACEAE—(Continued)</b>								
ANEMONE MULTIFIDA Poir.....			x					
CANADENSIS L.....	x	x		x			x	x
QUINQUEFOLIA L.....		x						
CALTHA PALUSTRIS L.....		x	x	x			x	
COPTIS GROENLANDICA (Oeder) Fernald.....					x		x	
ACTAEA RUBRA (Ait.) Willd.....		x	x	x				
<b>CRUCIFERAE</b>								
DRABA LUTEOLA Greene.....			x			x		
INCANA L.....				x				
RUPESTRIS R. Br.....						x		
CAPSELLA BURSA-PASTORIS (L.) Medic.....				x			x	
BRAYA HUMILIS (C. A. Mey.) Robinson.....	x	x						
RORIPPA PALUSTRIS (L.) Moench.....							x	
ARABIS HUMIFUSA (J. Vahl) S. Wats.....			x					
<b>DROSERACEAE</b>								
DROSEROTA ROTUNDIFOLIA L., var. COMOSA Fernald.....						x		
LONGIFOLIA L.....					x			
<b>SAXIFRAGACEAE</b>								
MITELLA NUDA L.....	x	x	x	x			x	
PARNASSIA MULTISETA (Ledeb.) Fernald.....			x			x		x
RIBES LACUSTRE (Pers.) Poir.....	x	x						
GLANDULOSUM Grauer.....				x		x	x	
TRISTE Pallas, var. ALBINERVIVM (Michx.) Fernald.....		x	x					
HIRTELLUM Michx.....		x		x	x			
HIRTELLUM Michx., var. CALCICOLA Fernald.....								x
<b>ROSACEAE</b>								
PHYSOCARPUS OPULIFOLIUS (L.) Maxim.....	x	x						
PYRUS AMERICANA (Marsh.) DC.....	x	x		x	x		x	
AMELANCHIER SANGUINEA (Pursh) DC.....			x			x		
BARTRAMIANA (Tausch) Roemer.....					x		x	
FRAGARIA VIRGINIANA Duchesne.....	x	x		x				
VIRGINIANA, var. TERRAE-NOVAE (Rydb.) Fern. & Wieg.....		x	x		x		x	x
POTENTILLA NORVEGICA L., var. HIRSUTA (Michx.) Lehm.....		x		x				
PALUSTRIS (L.) Scop.....				x	x		x	x
TRIDENTATA Ait.....			x	x	x		x	
FRUTICOSA L.....	x				x			x
ANSERINA L.....	x	x		x	x		x	
GEUM MACROPHYLLUM Willd.....				x			x	
STRICTUM Ait.....								x
RIVALE L.....	x	x	x		x			
RUBUS IDAEUS L., var. STRIGOSUS (Michx.) Maxim.....		x					x	
IDAEUS, var. CANADENSIS Richardson.....		x		x				
CHAMAEMORUS L.....				x	x			
TRIFLORUS Richards.....	x	x	x	x	x			x
ARCTICUS L.....					x			
ACAULIS Michx.....			x			x	x	x
ROSA ACICULARIS Lindl.....	x	x	x				x	x
PRUNUS PENNSYLVANICA L. f.....							x	



	1	2	3	4	5	6	7	8
<b>LEGUMINOSAE</b>								
TRIFOLIUM PRATENSE L.	×							
REPENS L.	×	×		×			×	
OXYTROPIS JOHANNANSIS Fernald.	×	×						
VICIA CRACCA L.				×				
AMERICANA Muhl.		×						
LATHYRUS JAPONICUS Willd., var. ALEUTICUS (Greene)			×					
Fernald.			×			×	×	×
PALUSTRIS L., var. LINEARIFOLIUS Seringe.		×			×	×		×
<b>LINACEAE</b>								
LINUM LEWISII Pursh.			×					
<b>POLYGALACEAE</b>								
POLYGALA SENEGA L.	×							
<b>EMPETRACEAE</b>								
EMPETRUM NIGRUM L.			×		×		×	
<b>RHAMNACEAE</b>								
RHAMNUS ALNIFOLIA L'Hér.	×	×						
<b>VIOLACEAE</b>								
VIOLA PALLENS (Banks) Brainard.				×				
NEPHROPHYLLA Greene.	×	×						×
LABRADORICA Schrank.					×			
<b>ELAEAGNACEAE</b>								
ELAEAGNUS ARGENTEA Pursh.	×		×		×			×
SHEPHERDIA CANADENSIS (L.) Nutt.			×		×	×		×
<b>ONAGRACEAE</b>								
EPILOBIUM ANGUSTIFOLIUM L.							×	×
ANGUSTIFOLIUM, var. INTERMEDIUM								
(Wormsk.) Fernald.			×			×		
PALUSTRE L.								×
LACTIFLORUM Haussk.			×					×
DAVURICUM Fisch.								×
OENOTHERA MURICATA L.								×
CIRCAEA ALPINA L.							×	
<b>HALORAGIDACEAE</b>								
MYRIOPHYLLUM EXALBESCENS Fernald.								×
HIPPURIS VULGARIS L.							×	×
VULGARIS, var. MARITIMA Hartm.							×	
<b>ARALIACEAE</b>								
ARALIA NUDICAULIS L.	×	×						
<b>UMBELLIFERAE</b>								
SANICULA MARILANDICA L., var. BOREALIS Fernald.	×	×						
CICUTA MACULATA L.								×
CARUM CARVI L.				×				
Sium SUAVE Walt.		×	×					×
LIGUSTICUM SCOTICUM L.						×		×
HERACLEUM LANATUM Michx.			×	×	×		×	×
ANGELICA ATROPURPUREA L.			×					

	1	2	3	4	5	6	7	8
<b>CORNACEAE</b>								
CORNUS CANADENSIS L. ....	x	x		x	x	x	x	
STOLONIFERA Michx. ....	x	x		x		x	x	
<b>ERICACEAE</b>								
MONESES UNIFLORA (L.) Gray. ....	x	x		x				
PYROLA MINOR L. ....				x				
SECUNDA L., var. OBTUSATA Turcz. ....		x	x		x			
CHLORANTHA Sw. ....	x					x	x	
GRANDIFLORA Rad. ....			x					
ASARIFOLIA Michx., var. INCARNATA (Fisch.) Fernald. ....								x
LEDUM GROENLANDICUM Oeder. ....			x	x	x		x	
KALMIA POLIFOLIA Wang. ....					x			
ANDROMEDA GLAUCOPHYLLA Link. ....					x	x		
CHAMAEDAPHNE CALYCVLATA (L.) Moench. ....				x				
ARCTOSTAPHYLOS UVA-URSI (L.) Spreng., var. COAC- TILIS Fernald & MacBride. ....			x					
RUBRA (Rehder & Wilson) Fernald. ..						x		
CHIOGENES HISPIDULA (L.) T. & G. ....				x				
VACCINIUM ANGUSTIFOLIUM Ait., var. MYRTILLOIDES (Michx.) House. ....				x	x		x	
CANADENSE Kalm. ....	x							
ULIGINOSUM L. ....					x			
CESPITOSUM Michx. ....			x				x	
VITIS-IDAEA L., var. MINUS Lodd. ....			x		x	x		
OXYCOCUS L. ....				x	x			
<b>PRIMULACEAE</b>								
PRIMULA MISTASSINICA Michx. ....	x	x	x					
EGALIKSENSIS Wormskj. ....					x	x	x	
LYSIMACHIA THYRSIFLORA L. ....		x						
TRIENTALIS AMERICANA (Pers.) Pursh. ....	x		x	x	x		x	
GLAUX MARITIMA L., var. OBTUSIFOLIA Fernald. ....					x	x		
<b>GENTIANACEAE</b>								
MENYANTHES TRIFOLIATA L., var. MINOR Michx. ....				x	x			
<b>BORAGINACEAE</b>								
MERTENSIA PANICULATA (Ait.) G. Don. ....	x	x		x		x	x	x
<b>LABIATAE</b>								
SCUTELLARIA EPILOBIIFOLIA A. Hamilton. ....				x				
GALEOPSIS TETRAHIT L. ....				x				
LYCOPUS AMERICANUS Muhl. ....		x						
MENTHA ARVENSIS L., var. GLABRATA (Benth.) Fernald		x	x	x			x	
<b>SCROPHULARIACEAE</b>								
VERONICA AMERICANA Schwein. ....				x				
SCUTELLATA L. ....		x						
HUMIFUSA Dickson. ....				x			x	
CASTILLEJA PALLIDA (L.) Spreng., var. SEPTENTRION- ALIS (Lindl.) Gray. ....		x	x			x		x
PEDICULARIS GROENLANDICA Retz. ....				x	x	x		

	1	2	3	4	5	6	7	8
<b>LENTIBULARIACEAE</b>								
UTRICULARIA VULGARIS L., var. AMERICANA Gray . . . .								×
PINGUICULA VULGARIS L. . . . .	×		×					
<b>PLANTAGINACEAE</b>								
PLANTAGO MAJOR L. . . . .	×	×		×			×	
MAJOR, var. INTERMEDIA (Gilibert) Dcne. . . . .		×						
JUNCOIDES Lam., var. DECIPIENS (Barneoud) Fernald . . . . .			×			×		×
OLIGANTHOS R. & S., var. FALLAX Fernald . . . . .			×			×		
<b>RUBIACEAE</b>								
GALIUM APARINE L. . . . .		×						
BOREALE L. . . . .	×	×						
LABRADORICUM Wieg. . . . .			×	×	×			×
ASPRELLUM Michx. . . . .		×					×	
TRIFLORUM Michx. . . . .		×					×	
<b>CAPRIFOLIACEAE</b>								
LONICERA VILLOSA (Michx.) R. & S., var. TYPICA Fer- nald . . . . .				×			×	
INVOLUCRATA (Richards.) Banks . . . . .		×						
LINNAEA BOREALIS L., var. AMERICANA (Forbes) Rehder . . . . .	×	×	×	×			×	
VIBURNUM PAUCIFLORUM Raf. . . . .	×	×	×			×	×	×
<b>CAMPANULACEAE</b>								
CAMPANULA ROTUNDIFOLIA L. . . . .	×		×					×
<b>COMPOSITAE</b>								
EUPATORIUM MACULATUM L. . . . .		×						
SOLIDAGO MACROPHYLLA Pursh . . . . .							×	
ULIGINOSA Nutt. . . . .	×	×		×	×			×
GRAMINIFOLIA (L.) Salisb. . . . .								×
LEPIDA DC. . . . .		×						
ASTER LONGIFOLIUS Lam. . . . .	×	×						
ERIGERON HYSSOPIFOLIUS Michx. . . . .		×						
PHILADELPHICUS L. . . . .	×	×		×				×
ANTENNARIA APPENDICULATA Fernald . . . . .			×					
PULCHERRIMA (Hook.) Greene . . . . .	×	×			×			×
ACHILLEA LANULOSA Nutt. . . . .	×	×	×	×	×	×	×	×
CHRYSANTHEMUM ARCTICUM L. . . . .			×			×		
TANACETUM HURONENSE Nutt. . . . .			×					
ARTEMISIA CANADENSIS Michx. . . . .								×
BOREALIS Pall., var. PURSHII Bess. . . . .			×			×		×
CANDICANS Rydb. . . . .			×					×
PETASITES PALMATUS (Ait.) Gray . . . . .		×						
SAGITTATUS (Pursh) Gray . . . . .						×		
SENECIO PALUSTRIS (L.) Hook . . . . .								×
AUREUS L. . . . .	×	×						
PAUPERCULUS Michx. . . . .								×
CIRSIIUM ARVENSE (L.) Scop. . . . .		×		×				
LACTUCA PULCHELLA (Pursh) DC. . . . .		×						×
PRENANTHES RACEMOSA Michx. . . . .			×			×		×

CLARK UNIVERSITY,  
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## DRABA IN TEMPERATE NORTHEASTERN AMERICA

M. L. FERNALD

(Continued from page 261)

1. *DRABA ALPINA* L. *Densely caespitose*, the caudex forming several crowded crowns with masses of dead marcescent foliage below the living rosette: leaves flat, elliptic-lanceolate, oblanceolate or narrowly oblong, obtuse to subacute, entire or nearly so, 0.7–2 cm. long, 2–5 mm. wide, glabrous or more or less pubescent with simple or forking trichomes on one or both surfaces, conspicuously villous-ciliate with simple trichomes about 1 mm. long, rarely with forking hairs intermixed: flowering stem a naked scape, rarely with a leafy bract subtending the lowest flower, 3–15 (rarely –20) cm. high, hispid with simple and forking trichomes; raceme at first corymbiform, in fruit corymbose-racemose, 4–20-flowered: rachis and slender pedicels (up to 1 cm. long) copiously villous-hirsute; sepals oblong to oblong-ovate, rounded at summit, 1.5–3 mm. long, more or less villous: petals yellow, obovate, shallowly emarginate, 3.5–5.5 mm. long, 2.5–4 mm. broad: anthers 0.5–0.7 mm. long: ovary glabrous or sparsely hispid; style 0.5–0.7 mm. long; siliques narrowly to broadly ovate, elliptic or oblong, 4–9 mm. long, 2–4 mm. broad, glabrous or sparsely hispid, with 12–20 seeds 1.3–1.5 mm. long.—Sp. Pl. ii. 642 (1753); O. E. Schulz in Engler, Pflanzenr. iv<sup>105</sup>. 84, fig. 8 (1927); Elis. Ekm. Svensk Bot. Tidskr. xxv. 479 (1931).—Arctic and subarctic regions, south on calcareous areas to Hudson Strait and the northern shores of Hudson Bay; northern Eurasia. LABRADOR: Ekortarsuk, Cape Chidley, C. Schmitt, no. 289; crevices of rock, Cape Chidley, August 6, 1884, R. Bell. UNGAVA: Port Burwell, Hudson Strait, J. M. Macoun, no. 79,069, *Malte*, no. 119,988. PLATE 290, FIGS. 1–4; MAP 1.

Var. *NANA* Hook.

Leaves with numerous long and simple or variously forking trichomes on the surfaces, 0.3–1 cm. long: scapes 0.5–7 cm. high.—Trans. Linn. Soc. xiv. 363 (1825). *D. Bellii* Holm in Fedde, Repert. iii. 338 (1907); Macoun, Geol. Surv. Can. t. 1 (date unknown); Payson, Am. Journ. Bot. iv. 261 (1917); Elis. Ekm. Svensk Bot. Tidskr. xxv. 469 (1931). *D. alpina*, var. *Bellii* (Holm) O. E. Schulz in Engler, Pflanzenr. iv<sup>105</sup>. 89 (1927).—



Map 1. Range in eastern America of *DRABA ALPINA*.

DRABA

Arctic regions, south to Hudson Strait. UNGAVA: Port Burwell, Hudson Strait, *J. M. Macoun*, no. 79,072 (mixed with *D. fladnizensis*, var. *heterotricha*): crevices of rocks, Mansfield Island, August 30, 1884, *R. Bell*. PLATE 290, FIGS. 5-7.

I am not convinced by the treatments of either the late Dr. Payson or of Mrs. Ekman that *Draba Bellii* is a species distinct from *D. alpina*. It seems to me an extreme arctic development, with the regular reduction in size and the increase of trichomes which one would expect under most xerophytic conditions. The beautiful series of plants collected by Dr. W. Elmer Ekblaw on the Crocker Land Expedition of 1913-16 in northwestern Greenland contains quantities of material bearing out this interpretation. It is also significant that on the sheet of the isotype of *D. Bellii* in the Gray Herbarium the late Professor Ostenfeld, who certainly understood *Draba* in the Arctic better than most botanists, wrote "only *D. alpina*."

Numerous names have been proposed for the dwarf arctic extreme and Schulz recognizes in arctic and subarctic America the following, besides typical *D. alpina*: var. *nana* Hook., which he makes include var. *glacialis* Th. M. Fries (1869), not other authors; var. *Adamsii* (Ledeb.) O. E. Schulz, based upon *D. Adamsii* Ledeb. (1842), which Mrs. Ekman, l. c. 466, has identified, by comparison with the types, with the wholly different *D. micropetala* Hook. (1825); var. *Pohlei* O. E. Schulz, cited from Cape Chidley, and differing only in its narrow siliques (2-2.5 mm. wide); var. *Bellii* (above discussed); var. *corymbosa* (R. Br.) Durand (1856), based on *D. corymbosa* R. Br. (1819), which, as Mrs. Ekman has shown (l. c. 493), was based on the identical type of *Cochlearia fenestrata* R. Br. to which genus and species *D. corymbosa* actually belongs; and var. *pilosa* (Adams) Regel, based on *D. pilosa* Adams, the type of which, according to Mrs. Ekman (l. c. 484) is a wholly different plant from any form of *D. alpina*, with "linear, carinate leaves, which are keeled on the underside and ciliate in long, hispid, simple hairs. The upper part of the stalk is glabrous like the pedicels" etc.

For our dwarf extreme of *Draba alpina* the name var. *nana* Hook. seems safe, at least.

2. *D. FLADNIZENSIS* Wulfen, var. *HETEROTRICHA* (Lindblom) Ball. Loosely to densely *cespitose*, the many branches and branchlets of the *caudex* closely *invested below* the living rosettes with pale, marcescent *subulate midribs* of former leaves: *leaves* oblanceolate, thin, 0.5-

1.5 cm. long, 1.5–4 mm. wide, entire or sparingly toothed, with firm and finally prominent midrib, ciliate with simple or bifurcate trichomes, the surfaces glabrous except for simple, forking and stellate pubescence toward the tips of the expanding leaves; flowering stems very slender, filiform, scapose, very rarely with a small leaf, glabrous or sparsely hirtellous, 1–10 cm. high: raceme at first corymbiform, becoming short-racemose, with mature rachis 0.5–4 cm. long, 2–13-flowered: flowering pedicels up to 6 mm. long: sepals oblong, rounded at summit, 2–2.5 mm. long, 1.2–1.8 mm. broad, sparsely hirsute or glabrous: petals white, obovate, emarginate, 3.5–5 mm. long, 2–3.5 mm. broad: anthers 0.5 mm. long: ovary glabrous, with a very short style; siliques oblong to narrowly ovate, 5–10 mm. long, 2–3.5 mm. broad, glabrous, only obscurely or scarcely reticulate; septum without median fold or with slight basal fold: seeds 16–20, often apiculate, 1–1.5 mm. long.—

Bull. Soc. Bot. Fr. vii. 230 (1860). *D. lactea* Adams, Mém. Soc. Nat. Mosc. v. 104 (1817); DC. Syst. ii. 347 (1821) and Prodr. i. 170 (1824); O. E. Schulz in Engler, Pflanzenr. iv<sup>105</sup>. 261, fig. 25, H–L (1927). *D. androsacea* Wahlenb. Fl. Lapp. 174, t. 11, fig. 5 (1812) and various Am. auth., not Willd. (1800). *D. Wahlenbergii* Hartm. Handb. Skand. Fl. 249 (1820) and many later authors. *D. lapponica* DC. Syst. ii. 344 (1821) and many later authors. *D. Wahlenbergii*,  $\beta$ . *heterotricha* Lindbl. Linnaea, xiii. 324 (1839). *D. fladnizensis* Wats. in Gray, Syn. Fl. N. A. i<sup>1</sup>. 109 (1895) and other Am. auth. in part, not Wulfen (1778). *D. fladnizensis* \**lactea* (Adams) and \**lapponica* (Willd.)

Dahl in Blytt, Haandb. Norges Fl. ed. Dahl, 382 (1906).—Arctic regions, south to the Tornat region of Labrador, Hudson Bay and the Canadian Rocky Mts.; northern Eurasia. LABRADOR: on slaty talus slope, Rowsell Harbor, lat. 58° 58', Abbe & Odell, no. 373; moist, mossy, northern face of Ridge (ca. 320 m.) extending south from East Bay, Ikordlearsuk, lat. 59° 55', Abbe & Odell, no. 382; steep, wet, cold bank of "K" River, Kangalaksiorvik, lat. 59° 18', Abbe, no. 375; spur on southwest side (1140 m.), Mount Tetragona, lat. 59° 18', Abbe, no. 379; lower slopes, north side of Komaktorvik, lat. 59° 16', Abbe, no. 376; top of ridge north of harbor, Razorback Harbor, lat. 59° 14', Abbe, no. 384; scree slide from top of Precipice Ridge to Komaktorvik Lake, lat. 59° 12', Abbe, nos. 380, 381; on granitic rock, North Shore of Duck Bight, north of Ryan's Bay, Woodworth, no. 239; Okkak, Moravian Bros.; Ramah, A. Stecker, no. 212x; East Summit of Bishop's Mitre, lat. 57° 56', Abbe, no. 386; West Summit of Bishop's Mitre, Abbe, no. 387. UNGAVA: Port



Map 2. Southeastern Extension in America of *DRABA FLADNIZENSIS*, var. *HETEROTRICHIA*.



Burwell, Hudson Strait, *J. M. Macoun*, no. 79,072 (mixed with *D. alpina*, var. *nana*), *Multe*, nos. 120,038, 120,062, 120,136, 120,136a. PLATE 291; MAP 2.

Although some recent European authors keep *Draba lactea* Adams (*D. Wahlenbergii* Hartm.) apart as a species from *D. fladnizensis*, it is significant that the characters relied upon are not of the first importance. Lange, Ostenfeld and numerous others have united them and in Hultén's Flora of Kamtchatka, where *Draba* was worked up by Mrs. Ekman, she says of *D. lactea*:

These specimens from Kamtchatka have some simple hairs even on the surface of the leaves and seem like most Siberian material somewhat infected with *D. fladnizensis* WULF.

*D. lactea* ADAMS has been identified by SCHULZ with *D. Wahlenbergii* HARTM. and *D. lapponica* DC. This identification is probably right, as the specimens in Herb. DE CANDOLLE given to DC. by STEVENS and FISCHER belong to these species,

From the diagnosis of ADAMS (loc. cit.) [of *D. lactea*] one must also conclude that *D. fladnizensis* is meant. ADAMS thus describes the leaves as "superne fere glabra subtus et ad marginem pilis simplicibus hispida" and mentions nothing about the stellate hairs that are characteristic of *D. Wahlenbergii*. This contradiction between the diagnosis and the second-type plants can only be explained under the assumption that, when making the diagnosis, ADAMS has had in view such impure, somewhat intermediate specimens as these here mentioned from Kamtchatka.<sup>1</sup>

Since, as would appear from the above and numerous other published items, much of the Siberian (as well as Arctic) material is transitional from *D. fladnizensis* to *D. lactea* and since all the Kamtchatkan material is called *D. lactea* "somewhat infected by *D. fladnizensis*," although the latter is not known from Kamtchatka, I find myself beyond my depth in attempting to separate them as species. Further doubt of the specific distinctions of *D. fladnizensis* and *D. lactea* is encountered in Schulz's treatment of the Gaspé plant. The only relative of *D. fladnizensis* in southeastern Quebec is a common, densely matted species (PLATE 292) of the Shickshock Mountains, with strictly glabrous leaves, very narrow sepals and petals, lance-acuminate siliques mostly 4 or 5 mm. long and only 1-2 mm. wide, septum with a conspicuous and broad median flange, seeds only 10-16 in number: in other words a plant quite different from either *D. fladnizensis* or *D. lactea*. Nevertheless, upon one collection of this completely isolated and endemic Shickshock species Schulz extends *D. lactea* to Gaspé: "Lower Canada: Table-Topped Mts., Gaspé Co. (J. A. Allen 1881)." Upon another collection of the same plant he

<sup>1</sup> Elis. Ekm. in Hultén, Fl. Kamtch. ii. 163 (1928).



DRABA ALPINA: FIG. 1, flowering plant,  $\times 1$ , from Norway; FIG. 2, small fruiting plant,  $\times 1$ , from Torne Lappmark; FIG. 3, portion of rosette,  $\times 10$ , from fig. 2; FIG. 4, summit of scape,  $\times 10$ , from fig. 2.

D. ALPINA, var. NANA: FIG. 5, fruiting plant,  $\times 1$ , from Mansfield Island, Hudson Bay (isotype of *D. Bellii*); FIG. 6, flowering plant,  $\times 1$ , from Thule, northwest Greenland; FIG. 7, leaves,  $\times 10$ , from fig. 6.



*DRABA FLADNIZENSIS*, var. *HETEROTRICHA*: FIG. 1, small flowering plant,  $\times 1$ , from Thule, northwest Greenland; FIG. 2, fruiting plant,  $\times 1$ , from Labrador; FIG. 3, tips of leaves,  $\times 10$ , from fig. 1; FIGS. 4 and 5, valve and septum,  $\times 10$ , from Torne Lappmark.





*DRABA ALLENI*, n. sp.: FIG. 1, portion of flowering plant,  $\times 1$ ; FIG. 2, portion of fruiting plant,  $\times 1$ ; FIG. 3, leaves,  $\times 10$ ; FIG. 4, flowers,  $\times 10$ ; FIGS. 5 and 6, valve and septum,  $\times 10$ ; all from Shickshock Mts., Quebec.

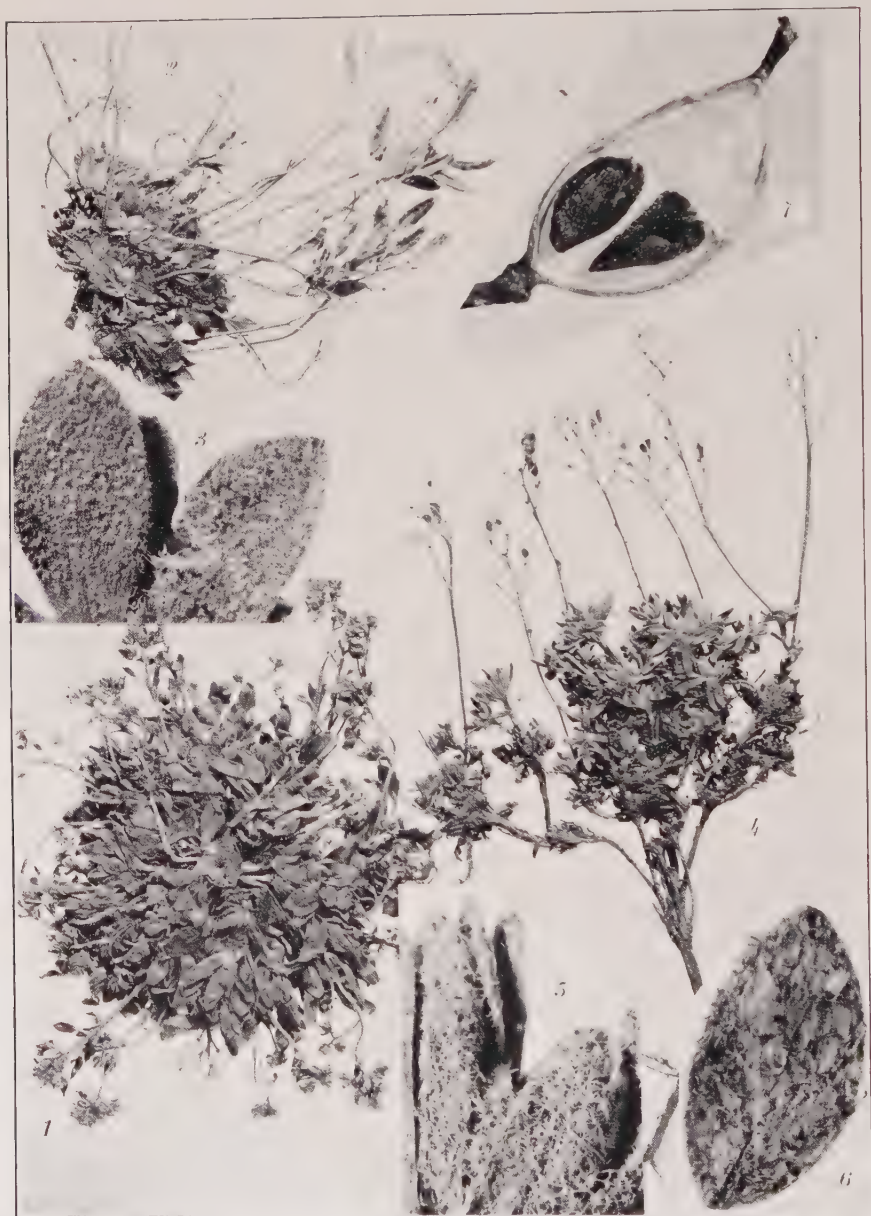


*DRABA RUPESTRIS*: FIG. 1, small flowering plant,  $\times 1$ , from type locality, Ben Lawers, Scotland; FIG. 2, fruiting plant,  $\times 1$ , from Newfoundland; FIG. 3, flowering plant,  $\times 1$ , from Labrador; FIG. 4, leaves,  $\times 10$ , from fig. 2.



DRABA CRASSIFOLIA: FIG. 1, small flowering plants,  $\times 1$ , from original collection of Drummond; FIG. 2, flowering and fruiting plants from Labrador; FIGS. 3 and 4, fruiting and flowering plants from Greenland,  $\times 1$ ; FIG. 5, leaf and base of scape,  $\times 10$ , from fig. 2; FIG. 6, flower,  $\times 10$ , from fig. 4.





*DRABA NIVALIS*: FIG. 1, flowering plant,  $\times 1$ , from Greenland; FIG. 2, fruiting plant,  $\times 1$ , from Greenland; FIG. 3, leaves,  $\times 10$ , from Newfoundland.

*D. PEASEI*, n. sp.: FIG. 4, fruiting plant (TYPE),  $\times 1$ , from Gaspé Co., Quebec; FIG. 5, tips of leaves,  $\times 10$ , from the TYPE; FIG. 6, valve,  $\times 10$ , from the TYPE; FIG. 7, septum and seeds,  $\times 10$ , from the TYPE.





DRABA AUREA: FIG. 1, small flowering plant,  $\times 1$ , from Greenland; FIG. 2, small fruiting plant,  $\times 1$ , from Greenland; FIG. 3, fruiting plant,  $\times 1$ , from Alberta.



DRABA MINGANENSIS, n. sp.: FIGS. 1, 2 and 3, small flowering plants,  $\times 1$ , from Archipel de Mingan, Quebec (isotypes of *D. luteola*, var. *minganensis*); FIG. 4, flower,  $\times 10$ , from fig. 1; FIG. 5, small fruiting plant,  $\times 1$ , from Bic, Quebec.

D. LUTEOLA: FIG. 6, fruiting plant,  $\times 1$ , from Colorado; FIG. 7, silique,  $\times 10$ , from fig. 6.



DRABA MINGANENSIS: FIG. 1, well developed fruiting plant,  $\times 1$ , from Bic, Quebec; FIGS. 2 and 3, flowers and tip of silique,  $\times 10$ , from Bic.





bases his single record of the strictly Eurasian *D. fladnizensis* for all North America: "K a n a d a: Quebec, Matane Co., Mt. Mat-taouisse, Südseite des Fernald Passes, 915-1000 m ü. M. (M. L. Fernald, Ludlow Griscom, K. K. Mackenzie, A. S. Pease, L. B. Smith 1923, n. 25779, hb. Deless.)"—Schulz, p. 257. If the uniform and wholly isolated Gaspé plant is both *D. lactea* and *D. fladnizensis* (which it is not), it would seem that fuller demonstration is needed before *D. lactea* and *D. fladnizensis* are accepted as distinct species. The Malte collections from Hudson Strait have been identified by Mrs. Ekman as *D. lactea* and as *D. lactea* crossed with various other species (*D. nivalis*, *D. rupestris*, etc.). See comments on p. 250.

3. *D. Allenii*, sp. nov. (TAB. 292), planta valde humifusa stragula 0.3-2 dm. diametro formans; caudicorum ramis ramulisque filiformibus albescentibus confertis, inferne nervis mediis foliorum emortuorum persistentibus subulatis albidis nitidulis squamatis, superne foliis rosulatis cespitem laxum 0.5-2 dm. diametro formantibus; foliis tenuibus oblanceolatis 0.5-1.5 cm. longis 1-3 mm. latis subacutis integris vel subintegris enascentibus margine pilis simplicibus 0.2-0.5 mm. longis erectis deinde deciduis raro ciliatis caeterum glabris nerviis mediis subtus prominentibus; caulibus filiformibus simplicibus scapiformibus vel raro imo folio unico praeditis glabris nitidis 1-8 cm. altis; racemis floriferis confertis fructiferis parum elongatis (rhachi 0.2-2.5 cm. longo) 2-8-floris; pedicellis imis fructiferis 1.5-5.5 mm. longis; sepalis anguste oblongis 1.2-2 mm. longis 0.5-1 mm. latis submembranaceis glabris; petalis lacteis obovatis emarginatis 2-3 mm. longis 1-2 mm. latis; antheris 0.2 mm. longis; ovariis glabris 10-16-ovulatis; siliculis glabris oblongo-lanceolatis acutis vel acuminatis 2.7-7 mm. longis 1-2 mm. latis stylo 0.2-0.6 mm. longo coronatis, valvis reticulato-nervosis, septi medio valde plicato; seminibus a funiculis 0.2-0.5 mm. longis pendulis ovoideis brunneis 0.7-1.1 mm. longis.—Alpine areas of the Schickshock Mountains, Gaspé and Matane Cos., QUEBEC: on rock, at about 915 m. (3000 ft.), Table-topped Mountain, August 10, 1881, *J. A. Allen* (distributed as *D. androsacca*); abrupt, western calcareous slopes, alt. 1000-1100 m., Table-topped Mt., August 5, 1906, *Fernald & Collins*, no. 226 (distributed as *D. corymbosa*); calcareous cliffs, facing north, alt. 900-



Map 3. Range of *DRABA ALLENI*.

1125 m., Table-topped Mt., August 7, 1906, *Fernald & Collins*, no. 581; mossy hornblende-schist at about 915 m. (3000 ft.) near eastern end of the basin, northeastern slope of "Mt. Logan" [later determined to be Mt. Mattaouisse], July 22, 1922, *Fernald & Pease*, nos. 25,097, 25,101, 25,102; cold chimneys and rock-shelves at about 915-1000 m. alt., south side of Fernald Pass, Mt. Mattaouisse, July 8, 1923, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 25,779 (TYPE in Gray Herb.); cold schistose walls at head (alt. about 1070 m.) of Big Chimney, Mt. Mattaouisse, July 14, 1923, *Fernald, Griscom, Pease & Smith*, no. 25,783; boggy openings in Fernald Pass, alt. about 885 m., between Mts. Mattaouisse and Fortin, August 20, 1923, *Fernald & Smith*, no. 27,780; moist turfy chimneys at about 850-1000 m. alt., southern slope of Mt. Fortin, July 12, 1923, *Fernald, Griscom & Mackenzie*, no. 25,781; gravelly and turfy slides and chimneys at about 850-1000 m. alt., in the steep schistose southern face of Mt. Fortin, August 21, 1923, *Fernald & Smith*, no. 25,784; cold, mossy chimneys (alt. about 800-1050 m.) at head of Pease Basin, between Mts. Logan and Pembroke, July 13, 1923, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 25,782. All distributed, unless otherwise noted, as *D. fladnizensis*. MAP 3.

*Draba Allenii*, like *Ranunculus Allenii* Robinson, commemorates the pioneer botanical explorations of the Shickshock Mts. by JOHN ALPHEUS ALLEN, 1863-1916. Although obviously related to *D. fladnizensis* Wulfen and *D. fladnizensis*, var. *heterotricha* (Lindbl.) Ball (*D. lactea* Adams; *D. Wahlenbergii* Hartm.), PLATE 291, it differs from them both in important characters. Schulz, as noted in the discussion of *D. fladnizensis*, var. *heterotricha*, cites the two specimens of *D. Allenii* which had come to his attention, one as the only basis in North America of *D. fladnizensis*, as var. *laxior* (Gaudin) O. E. Schulz, based on *D. sclerophylla* Gaud.,  $\beta$ . *laxior* Gaudin; the other as the only eastern Canadian representative of *D. lactea*.

Whether *D. sclerophylla*,  $\beta$ . *laxior* Gaudin is properly referable to *D. fladnizensis* is a question for students of the alpine flora of Europe to determine; but from *D. Allenii* it is very definitely distinguished by the following points specially noted in Gaudin's original and very detailed description: "*Rosulae* sessiles, densissime caespitosae, aggregatae et quasi confluentes" (in *D. Allenii* the rosettes terminating loosely elongate caudices and themselves very lax); "*Folia* . . . dura, . . . lineari-ligulata, . . . obsolete uninervia, . . . pilis mere marginalibus, rigidis" (in *D. Allenii* leaves thin and membranaceous, oblanceolate, very prominently costate beneath, mostly eciliate, but rarely with a few flexuous cilia); "*Flores* . . . per exsiccationem ochroleuci" (in *D. Allenii* with no

obvious yellow after 10–12 years); “*Siliculae* . . . pedunculum aequantes, . . . ovales, . . . stigmatē sessili” (in *D. Allenii* siliques much shorter than pedicels, lance-acuminate, with definite style). In general one does not expect in Gaspé local plants of the Swiss Alps, unless they have been found to have a broad circumpolar dispersal; and Schulz’s account of his *D. fladnizensis*, var. *laxior* contains a point not mentioned by Gaudin, which is inconsistent with *D. Allenii* being the European plant: “Pedicelli . . . , inferiores (1–2) saepe ex axilla folii prodeuntes” (never in *D. Allenii*).

*Draba fladnizensis*, as shown in the original plate and in other excellent illustrations as well as in specimens from the Tirol and from the Rhaetic Alps and other continental European mountains, is, as well described by Schulz, a densely caespitose plant, with closely crowded short crowns, the oblong leaves very conspicuously and permanently ciliate with long stiff divergent trichomes, the siliques ellipsoid or oblong, obtuse, with valves scarcely reticulate, the septum without a long fold, the seeds 12–20. *D. Allenii* in its humifuse habit, with elongate freely forking filiform caudices, its leaves, when rarely ciliate, with few short, soft and erect (not divergent) cilia, its lance-acuminate or acute siliques with distinctly veiny valves, strong longitudinal fold of the septum and fewer seeds, is abundantly distinct.

Whether or not *Draba lactea* (PLATE 291) is maintained as a species or is treated as a variety (var. *heterotricha*) of *D. fladnizensis*, it has little in common with *D. Allenii*: caespitose habit; coarsely ciliate and variously pubescent leaves; much larger flowers; oblong to narrowly ovate siliques averaging twice as large as in *D. Allenii* and with veinless valves, plane septum and more numerous and larger seeds.

*Draba Allenii* is presumably on Mt. Katahdin, Maine. On September 21, 1926, Dr. G. L. Stebbins, jr. found at 4000 feet in the Chimney of Mt. Katahdin two plants of a strange *Draba*. Dr. Stebbins’s published memorandum follows:

While looking at the plants of *Saxifraga aizoon* L. in the chimney, I noticed among them two plants of a *Draba* which I did not recognize, and which did not correspond to any of the *Drabas* described in Gray’s Manual. Although I searched the surrounding rocks, I failed to find more than two plants, so I dared to take only a stalk with the seed pods. When I showed this to Professor Fernald, he identified it as *Draba fladnizensis* Wulfen, an arctic-alpine species which had not been found before south of the Shickshock Mountains of Quebec, and is therefore new to New England. Although both the *Draba* and the *Saxifrage* are normally

lime-loving, they were growing here on granite rocks in an acid soil region, and seemed quite healthy. There may be a little rich pocket in that particular spot, and it would certainly be interesting to find the soil reaction there.<sup>1</sup>

Under date of January 6, 1934, Dr. Stebbins writes: "I have visited the spot where I found them three times since, and in each case as diligent search as I was able to make failed to reveal the two plants or any others. I have, of course, been very much on the lookout for it on other parts of the mountain, but it hasn't turned up yet. The only hope for a real stand of it is in a narrow ravine that branches off the chimney to the right at its base, and looks wicked for climbing, though I have no doubt that the same band of softer, presumably more calcareous rock traverses it that is found in the chimney itself, which harbors quite a little *Saxifraga aizoon*, and where I found the two plants mentioned."<sup>2</sup>

The much denuded fruiting raceme (with the valves gone) which Dr. Stebbins brought back seems to be that of *Draba Allenii*. Without seeing the foliage, however, it would be unwise to identify it with positiveness.

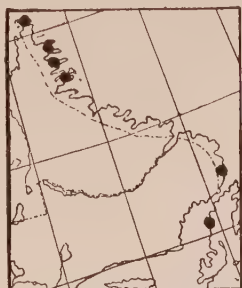
4. *D. RUPESTRIS* R. Br. Densely to loosely *cespitose*, the multicipal *caudex* with the short branches retaining *marcescent leaves* or their *shreds* and terminating in rosettes: *leaves* membranaceous, *linear-oblanccolate* to *oblong*, acutish, 5–15 mm. long, 1–3.3 mm. broad, 2–4-toothed or entire, *hispid* with simple or variously forking trichomes, the midrib delicate and *eranescent*; flowering stem capillary, naked (or rarely with 1–3 small leaves), 1–11 (—"25," Ekm.) cm. high, *hirtellous* with simple and forking trichomes or rarely glabrous: raceme during anthesis corymbose, in fruit elongating and with rachis up to 6 cm. long, 3–20-flowered; *pedicels* *hirtellous* with simple or forking trichomes, in maturity 1–4 mm. long; *sepals* narrowly oblong, 1.5 mm. long, *hirtellous*; petals white, obovate, 2.5–4 mm. long; ovary glabrous or *hirtellous* with simple and forking trichomes, 12–30-ovuled; *siliques* on *suberect* or *strongly ascending short pedicels*, oblong, 3–8 mm. long, *hirtellous* with simple or forking trichomes or glabrous (var. *LEIOCARPA* O. E. Schulz), with very short style: seeds oval,

<sup>1</sup> G. L. Stebbins, jr., RHODORA, xxix. 15, 16 (1927).

<sup>2</sup> Dr. E. T. Wherry, reporting on soil from the base of the *Saxifraga aizoon* from Mt. Katahdin, "found it to be exactly neutral. The lime producing this condition in the soil may have come from a local concentration of calcium minerals in the granite—which is well known to occur elsewhere in Maine, especially on Mt. Desert Island—or may have been set free by unusually thorough decomposition of the humus at this point. The thing most difficult to account for would seem to be the manner in which the seeds of these circumneutral soil species managed to 'find' this favorable spot in the middle of a vast area of soils too acid to permit the plants to thrive.—Wherry, RHODORA, xxix. 139, 140 (1927).



brown, 1–1.3 mm. long.—R. Br. in Hort. Kew. ed. 2. iv. 91 (1812); DC. Syst. ii. 344 (1821) and Prodr. i. 169 (1824); Elis. Ekm. Kungl. Svenska Vet.-Akad. Handl. ser. 3, lviii. no. 3: 53, t. 3, figs. *h* and *o* (1917); O. E. Schulz in Engler, Pflanzenr. iv<sup>105</sup>. 223 (1927). *D. hirta* Sm. Fl. Brit. ii. 677 (1800) and Engl. Bot. xix. t. 1338 (1804), not L. (1759). *D. hirta*,  $\gamma$  *rupestris* (R. Br.) Wahlenb. Fl. Suec. 399 (1824).—Northern Europe, Greenland, Labrador, Ungava and Newfoundland, very local. LABRADOR: Ramah, July 15–August 20, 1894, A. Stecker (distributed as *D. hirta*, var. *arctica*); Eastward side of East Summit of Bishop's Mitre, lat. 57° 56', August 21, 1931, Abbe, no. 385; Okkak, Weitz (Brit. Mus.); Battle Harbor, August 3, 1913, W. E. Ekblaw. UNGAVA: crevices of rock, Cape Chudleigh, R. Bell, no. 2027. NEWFOUNDLAND: limestone barren, near sea-level, Pointe Riche, August 4, 1910, Fernald, Wiegand & Kittredge, no. 3455, siliques glabrous = var. *LEIOCARPA* O. E. Schulz, l. c. 224 (1927). PLATE 293; MAP 4.



Map 4. Eastern American Range of *DRABA RUPESTRIS*.

*Draba rupestris* is obviously very rare in eastern America. The plants cited are fair matches for material from the type station, Ben Lawers (FIG. 1). Most of the plants, common in western and northern Newfoundland, with a marked variety in Gaspé, which have been passing as *D. rupestris* are better referred to the coarser and usually more leafy *D. norvegica* Gunner. Should it prove on further observation, as seems not unlikely, that *D. rupestris* and *D. norvegica* are confluent, the earliest name, *D. norvegica* Gunner (1772), should be used for both. I am here maintaining *D. rupestris* out of deference to the opinion of European students, although I expect that further study in the field will demonstrate it to be only an extreme phase of *D. norvegica*.

5. *D. CRASSIFOLIA* Graham. Short-lived perennial (biennial or annual ?) with simple or slightly branching caudex forming solitary rosettes or mats up to 5 cm. broad, glabrous throughout or the leaves sometimes ciliate: leaves somewhat fleshy, drying thin and subtranslucent, oblanceolate, obtuse or subacute, entire or essentially so, 0.4–1.5 cm. long, 1.5–5 mm. broad, glabrous throughout or frequently sparsely ciliate with simple (rarely bifurcate) trichomes 0.5–1 mm. long: scapes filiform, including the raceme 1–10 cm. high, naked or rarely with 1 or 2 leaves, glabrous: raceme at first corymbiform, elongating in fruit to 1–7 cm., 3 (rarely 1)–10-flowered, the lower 1–2 flowers remote: pedicels filiform, glabrous, the lower in fruit becoming 4–10

(rarely -22) mm. long: *sepals* oblong or oblong-elliptic, 1.5-2.3 mm. long: *petals* yellow, drying whitish, rarely white from the first, often



Map 5. Southeastern Extension in America of *DRABA CRASSIFOLIA*.

purple-tinged, narrowly spatulate-obovate to cuneate-oblongate, emarginate, 2-3 mm. long, 0.7-1.2 mm. wide: *anthers* 0.2-0.3 mm. long: *ovary* glabrous, with 16-20 *ovules* and sessile stigma: *siliques* on spreading or arched-ascending pedicels, elliptic-lanceolate to oblong, glabrous, 3-9.5 mm. long, capped by the sessile stigma; the valves scarcely nerved: *seeds* 0.75-0.8 mm. long.—Edinb. New Phil. Journ. (Apr.-June, 1829), 182 (1829); Hook. Fl. Bor.-Am. i. 54 (1830); Torr. & Gray, Fl. N. Am. i. 106 (1838); Lange, Consp. Fl. Groenl. 38 (1880); Wats. in Gray, Synop. Fl. N. Am. i. 108 (1895), mostly; Elis. Ekm. Kungl. Svenska Vet.-Akad. Handl. ser. 3, ii. no. 7: 32 (1926); O. E. Schulz in Engler, Pflanzenr. iv<sup>105</sup>. 325 (1927).—Greenland; Labrador; northernmost Ungava; Rocky Mountains of

Alberta and British Columbia, south in alpine areas, very locally, to Colorado; Arctic Europe. LABRADOR: steep, wet cold bank of "K" River, Kangalaksiorvik, lat. 59° 18', Abbe, no. 374; Ramah, Sornborger, no. 175 (mostly). UNGAVA: Port Burwell, Hudson Strait, Malte, no. 120,092. PLATE 294; MAP 5.

In western America passing into the following varieties:

Var. ALBERTINA (Greene) O. E. Schulz, l. c. 327 (1927). *D. albertina* Greene, Pittonia, iv. 312 (1901).—Leaves more or less pubescent with stellate as well as simple and bifurcate trichomes; the cilia often numerous and 0.7-1.3 mm. long; racemes up to 17-flowered.—Alberta and British Columbia to Colorado and California.

Var. PARRYI (Rydb.) O. E. Schulz, l. c. 327 (1927), as to type, but excluding Schulz's description and the Labrador plant. *D. Parryi* Rydb. Bull. Torr. Bot. Cl. xxix. 241 (1902).—Leaves linear-oblongate, 1-2.5 cm. long, 1-2.5 mm. wide, acutish, glabrous or ciliate only at base: flowering stems up to 1.6 dm. high, with racemes up to 25-flowered.—Colorado and Wyoming. PLATE 300, FIGS. 4 and 5.

Although *Draba crassifolia* is often said to be sometimes annual ("annual or biennial"—Watson; "Herba annua, dein perennans"—Schulz), I have seen few specimens which seem to be unquestionably annual; most of them have remnants of the last year's leaves below the fresh rosette. Those who have known the species best all treat it as perennial. Graham had before him the living plants which he had himself raised at Edinburgh from seeds "presented by Mr. Drummond in February 1828." These began flowering and fruiting

in 1829, and under date of "10th June 1829" Graham described his species: "Plant densely caespitose, perennial." That it is a perennial which begins flowering very promptly is, however, indicated by Graham's statement: "It flowers most freely, . . . produces abundance of seed, and has come up in many of the neighbouring pots in the Edinburgh Botanic Garden without any change of character." If by the latter statement Graham meant that the cultivated plant had, in slightly more than one year, seeded, scattered its seeds and produced a second crop which had matured far enough to justify his saying "without any change of character," then, in cultivation in a temperate climate, *D. crassifolia* may evidently become annual. Mrs. Ekman, who seems to have studied the Greenland and European plants very thoroughly, says, "*Planta saepe caespitosa*." On the other hand, specimens of Drummond's original material (FIG. 1), which had once belonged to Jacques Gay but which are now in the Gray Herbarium, bear Gay's comment: "Févr. 1851. La plante est évidemment annuelle! Hooker et Asa Gray la classent à tort parmi les espèces vivaces."

Rydberg, in his *Flora of the Rocky Mountains*, ed. 2: 350, 353, reduces *D. albertina* Greene, without qualification, to *D. crassifolia* and he defines the latter as having "leaves oblanceolate to spatulate, hirsute" as contrasted with the "leaves narrowly linear-oblanceolate, glabrous" of his own *D. Parryi* (PLATE 300, FIGS. 4 and 5), which he maintains as a species.

In view of the doubts raised as to the duration of *Draba crassifolia* and by the definition of it by Rydberg as having the leaves hirsute, it has seemed desirable to examine Graham's own specimen. This, most happily, has been possible through the kindness of my good friend, the Regius Keeper of the Royal Botanic Garden at Edinburgh, Sir William Wright Smith (to whom I here reexpress my sincere appreciation); and I now have before me the original specimen preserved by Graham: "*Draba crassifolia* Graham, Hort. Bot. Edin. 1829. Seeds from Arctic America."<sup>1</sup> This is, as Graham himself stated, identical with Drummond's material (PLATE 294, FIG. 1).

<sup>1</sup> Drummond collected the plant, as shown on the label of one of his specimens in the Gray Herbarium (sent by Hooker, with whose specimens Graham's cultivated plant is identical) on "Summits of the Rocky Mountains between lat. 52° and 57°." The assumption, very general in the reports on botanical explorations in British America in the 1st half of the 19th century, that all points slightly north of the international boundary were "arctic" has led to endless confusion, by the citation, by Hooker and others, of plants growing from 52°–57° as coming from "Arctic America."

It is the northernmost extreme of the species adequately and clearly described by Graham with "*Leaves* (5 lines long, 2 broad), much crowded, subcarinose, smooth, veinless [when fresh, although clearly veiny by transmitted light when dry], indistinctly keeled, subdenticulate, rather sparingly ciliated with simple spreading hairs."

Rydberg's description of his *Draba Parryi* (which I am treating as a Colorado variety of *D. crassifolia*) was

Annual, perfectly glabrous, except a few cilia on the petioles: stems several, usually less than 1 dm. high, scapiform or rarely with a stem leaf: basal leaves numerous, linear or narrowly linear-oblanccolate, 1.5-2.5 cm. long—; etc.

The Colorado material of var. *Parryi* (PLATE 300, FIGS. 4 and 5) has at most (so far as I have seen) about 24 seeds in a silique, the leaves are at most 2.5 mm. wide and the tallest stem seen is 1.6 dm. high. Schulz, however, in transferring *D. Parryi* to varietal rank, gives it a characterization so unlike that of Rydberg's species that it is apparent that he has confused something with it:

Planta altior et ramosior, fructifera usque ad 20 cm longa. Caules interdum 3-4-phylli. Folia longiora, usque 3 cm longa. . . . Ovarium 24-36-ovultum. Pedicelli inferiores saepe valde elongati, usque 2, 5 cm longi.

Schulz, furthermore, begins his citation of specimens with Labrador; and of the tall (up to 2.5 dm.), branching, large-leaved (leaves 3-8 mm. broad), leafy-stemmed plant from Ramah (*Sornborger*, no. 61), which may have as many as 48 ovules and which has petals twice as large as in *D. Parryi*, he specially comments: "August fruchtend, besonders luxuriös mit beblätterten Ästen." Schulz's description of var. *Parryi* was, apparently, derived chiefly from the wholly distinct plant of Labrador (our no. 11, PLATE 300, FIGS. 1-3).

I have not seen the other Labrador specimens cited by Schulz under var. *Parryi*; they may be like the *Sornborger* material. It should be noted, however, that "Cumberland Inlet," cited under Labrador, is presumably the well-known Cumberland Sound of Baffin Island.

6. *D. NIVALIS* Liljeb. Densely to loosely *cespitose*, forming mats 1-10 cm. across; the branches of the multicapital *caudex* clothed with *marcescent* shreds of dead leaves and ending in compact *subglobose* rosettes 3-15 mm. in diameter: *leaves* *cuneate-obovate* to broadly *oblanccolate*, *obtuse*, entire or essentially so, *subcoriaceous*, 3-11 mm. long, 1-4.5 mm. broad, with the firm subulate midrib prominent beneath, the surfaces *canescent-pannosa* with minute sessile or subsessile *stellate*



*trichomes: flowering stem naked* and scapose, very rarely with a single small leaf, filiform, 1–10 cm. high, *stellate-tomentulose*: raceme subcapitate at flowering, in fruit elongate into an open or lax raceme with rachis up to 6 cm. long, 1–13-flowered: pedicels stellate-tomentulose, very short in flower, elongating in fruit to 1–8 mm., then spreading or subascending: *sepals* narrowly oblong or narrowly ovate, 1.5–2 mm. long, *stellate-pilose*; *petals* white, cuneate-obovate, 2.5–3 mm. long, 1.2–2 mm. broad: anthers about 0.3 mm. long: ovary minutely stellate, 14–28-ovuled; *siliques* strongly flattened, lanceolate to narrowly oblong, narrowed to the short (0.1–0.4 mm.) style, *glabrous*, 4–9 mm. long, 1–2 mm. broad; *seeds* 14–28, 0.7–1 mm. long.—*Vet.-Akad. Handl.* (1793) 208 (1793), *Utkast til Sv. Fl. ed. 2*: 269, fig. 35 (1798) and *Nov. Act. Reg. Soc. Sci. Ups. vi.* 47, t. II, fig. 2 (1799); *Watson in Gray, Syn. Fl. N. Am. i.* 109 (1895); *Elis. Ekm. Kungl. Svenska Vet.-Akad. Handl. ser. 3, ii. no. 7*: 26, t. II, figs. 2, 7, 8, 10, 13 and 16 (1926); *O. E. Schulz in Engler, Pflanzenr. iv.*<sup>105</sup>, 209 (1927); *Elis. Ekm. Svensk Bot. Tidskr. xxvii.* 339 (1933). *D. muricella* *Wahlenb. Fl. Lapp.* 174 (1812); *Hook. Fl. Bor.-Am. i.* 52 (1830); *Torr. & Gr. Fl. N. Am. i.* 104 (1838). *D. Liljebladii* *Wallm. in Liljebl. Sv. Fl. ed. 3*: 350 (1816). *D. stellata, x. nivalis* (*Liljebl.*) *Regel, Bull. Soc. Nat. Mosc. xxxiv.*<sup>2</sup>, 192 (1861); *Macoun, Cat. Can. Pl. i.* 50 (1883).—Arctic regions and mts. of



Map 6. Southeastern extension in America of *DRABA NIVALIS*.

Eurasia and North America, south to the Straits of Belle Isle, Newfoundland, the Gaspé Peninsula, Quebec and shores of Hudson Bay. LABRADOR: talus slope, west side of the lower lake, Valley of the Bryant Lakes, Kangalaksiorvik, lat. 59° 23', *Abbe*, no. 383; spur on southwest side (alt. 1140 m.), Mount Tetragona, lat. 59° 18', *Abbe*, nos. 377, 378; Kangalaksiorvik Bay, September, 1908, *Owen Bryant*; on granitic rock, Head of Main Arm of Ekortarsuk Bay, *Woodworth*, no. 240; margin of solid polygon, upper ridge (ca. 840 m.), Cape Mugford Peninsula, lat. 57° 50', *Abbe*, no. 372; Okkak, *Moravian Brothers*; steep rocky hillside, Percoliak Island, Nain Bay, lat. 57°, *Harlow Bishop*, no. 324; Anatolak, *Swallow*, no. 516; Nain, *Lundberg* (*Brit. Mus.*); moist crevice near top of hill, Rodney Mundy Island, Indian Harbor, lat. 54° 27', *Abbe & Hogg*, no. 369; rocky places, Dead Islands, lat. 52° 48', July, 1882, *J. A. Allen*. UNGAVA: Port Burwell, Hudson Strait, *Malte*, nos. 120,098, 120,159. NEWFOUNDLAND: rocky crests, Cape Dégrat, Quirpon Island, *Fernald & Long*, nos. 28,344, 28,345; dry slaty crests of hills, Little Quirpon, *Fernald & Long*, no. 28,343; open

peaty and gravelly spots on crests of trap cliffs, Cape Onion, *Fernald & Long*, no. 28,346; crevices of trap cliffs, Anse aux Sauvages, *Fernald, Wiegand & Long*, no. 28,347; gravelly shelves, crests and talus of diorite, Ha-Ha Mountain, *Pease & Griscom*, no. 28,342. QUEBEC: calcareous sea-cliffs and rock-slides by the Gulf of St. Lawrence, slightly west of Marten River, Gaspé Co., *Fernald & Pease*, no. 25,100; roches humides des falaises, Ruisseau Sorel, Gaspé Co., *Victorin, Rolland & Jacques*, no. 33,675; on bare hornblende-schist near the summit, about 1100 m. (3600 ft.) alt., Mt. Fortin, *Fernald & Pease*, no. 25,099; moist turfy chimneys at about 850–1000 m. alt., in steep schistose southern face of Mt. Fortin, *Fernald, Griscom & Mackenzie*, no. 25,786, *Fernald & Smith*, no. 25,788; cold chimneys and rock-slides at about 915–1000 m. alt., south side of Fernald Pass, Mt. Mattaouisse, *Fernald, Griscom, Mackenzie, Pease & Smith*, no. 25,785; cliffs and chimneys at about 800–1050 m. alt., east of Big Cascade, Pease Basin, between Mts. Logan and Pembroke, *Dodge & Pease*, no. 25,787. PLATE 295, FIGS. 1–3; MAP 6.

7. *D. Peasei*, sp. n. (TAB. 295, FIGS. 4–7), planta laxe cespitosa stragula 6 cm. diametro formans; caudicorum ramis filiformibus albescentibus nitidis inferne foliis emortuis vix fibrillosis squamatis, superne foliis rosulatis cespitem laxum 6–13 mm. diametro formantibus;



Map 7. Range of *DRABA PEASEI*.

foliis linearibus vel lineari-oblongatis acutis crassis 3–6.5 mm. longis 1–1.5 mm. latis integris valde costatis utrinque laxe stellato-pannosis stellis 0.3–0.4 diametro, foliis maturis glaberratis subcoriaceis nitidis; caulibus filiformibus scapiformibus 2 cm. altis stellato-hirtellis; floribus ignotis; racemis fructiferis parum elongatis (rhachi 1–2 cm. longo); pedicellis fructiferis stellato-hirtellis imis 4–6 mm. longis; siliquis stellato-hirtellis 3–6 ellipticis acutis 3–5.5 mm. longis 2–2.5 mm. latis stylo 0.8–1 mm. longo coronatis, valvis reticulato-nervosis; seminibus 1.2–1.8 mm. longis 4–5 in utroque loculo a funiculis 0.3–0.6 mm. longis pendulis.—QUEBEC: talus slope near Cape Rosier, Gaspé Co., July 18, 1928, *A. S. Pease*, no. 20,194 (TYPE in Gray Herb.). MAP 7.

*Draba Peasei*, with which it is a great pleasure to associate the name of its discoverer, ARTHUR STANLEY PEASE, distinguished classical scholar and keen amateur botanist, was at first identified by me as *D. oligosperma* Hook. of the Rocky Mountain region and under that name was reported by Pease, RHODORA, xxxi. 55 (1929). It is, however, quite distinct from *D. oligosperma* in several characters, although the few and very large seeds and the long style at once

suggest that species. But *D. oligosperma* has much narrower and rigid leaves with more pronounced keel, usually smoother scape, longer raceme, pedicels strongly thickened at summit, inequilateral siliques often subtended by marcescent sepals, the valves (when pubescent) bearing simple or bifurcate, rather than stellate trichomes. In its flattish leaves *D. Peasei* is nearer to *D. incerta* Payson, of the northern Rocky Mountains, but that likewise has the siliques with simpler pubescence (or glabrous), longer, and with a strongly marked inequilateral tendency and usually longer pedicels (lowest in maturity 5–15 mm. long). Fuller and younger material of *D. Peasei* is needed, especially in flower and younger fruit. Its cordilleran allies have yellow petals.

8. *D. AUREA* M. Vahl. *Short-lived* perennial, or perhaps sometimes biennial, the simple to several-crowned *caudex covered below with marcescent leaves and their hardened bases*: new rosettes 2–7 cm. broad; *their leaves* oblanceolate to narrowly spatulate-obovate, narrowed to petioles, entire or obscurely dentate, 1–3.5 cm. long, 2–7 mm. broad, *canescent-pilose* on both surfaces with *mixed simple, variously forking and stellate trichomes*: *flowering stems* simple to freely branching, 1–4 dm. high, *pilose-hirsute with mixed pubescence*, leafy: *cauline leaves* 7–25, lanceolate, oblanceolate or oblong, entire or with low dentation, with *pubescence similar* to that of rosette and stem; *raceme* at first crowded, *finally much elongated and occupying  $\frac{1}{2}$ – $\frac{4}{5}$  the total height of the plant*, chiefly 10–60-flowered, the lower 4–12 flowers of the primary raceme usually leafy-bracted: *pedicels erect, the lowest becoming* 5–15 mm. long in fruit: sepals oblong or narrowly ovate, obtuse, pilose, 2–4 mm. long; *petals deep- to sulphur-yellow* when fresh, narrowly cuneate-obovate, rounded or but slightly emarginate at summit, 4–6 mm. long: anthers about 0.5 mm. long: ovary densely pubescent, with 30–50 ovules; *style elongate* (up to 1 mm. long): *siliques* lanceolate to linear-oblong, 0.7–2 cm. long, 1.5–3 mm. broad, *usually twisted, with style* 0.5–1.8 mm. long; *valves with dense mixed pilosity*: seeds 30–50, about 1 mm. long.—Vahl in Hornem. Fors. Dansk Oecon. Plantel. ed. 2: 599 (name), in Hornem. Fl. Dan. ix. fasc. xxv. 3, t. mcccclx (1818) and in Hornem. Fors. Dansk Oecon. Plantel. ed. 3,



Map 8. Range in eastern America of *DRABA AUREA*.

lowest becoming 5–15 mm. long in fruit: sepals oblong or narrowly ovate, obtuse, pilose, 2–4 mm. long; petals deep- to sulphur-yellow when fresh, narrowly cuneate-obovate, rounded or but slightly emarginate at summit, 4–6 mm. long: anthers about 0.5 mm. long: ovary densely pubescent, with 30–50 ovules; style elongate (up to 1 mm. long): siliques lanceolate to linear-oblong, 0.7–2 cm. long, 1.5–3 mm. broad, usually twisted, with style 0.5–1.8 mm. long; valves with dense mixed pilosity: seeds 30–50, about 1 mm. long.—Vahl in Hornem. Fors. Dansk Oecon. Plantel. ed. 2: 599 (name), in Hornem. Fl. Dan. ix. fasc. xxv. 3, t. mcccclx (1818) and in Hornem. Fors. Dansk Oecon. Plantel. ed. 3,

i. 696 (1821); DC. Syst. ii. 350 (1821) and Prodr. i. 170 (1824); Hook. Fl. Bor.-Am. ii. 55 (1830); Torr. & Gr. Fl. N. Am. i. 107 (1838); Watson in Gray, Syn. Fl. i<sup>l</sup>. 110 (1895) in large part; O. E. Schulz in Engler, Pflanzenr. i<sup>v-105</sup>. 175 (1927) as to main form. *D. aureiformis* Rydb. Bull. Torr. Bot. Cl. xxviii. 278 (May, 1901). *D. Bakeri* Greene, Pl. Baker. iii. 6 (Nov. 18, 1901). *D. uber* Nelson, Bot. Gaz. xxxiv. 366 (1902). *D. aurca*, var. *aureiformis* (Rydb.) O. E. Schulz, l. c. 176 (1927). *D. aurea*, var. *aureiformis*, forma *uber* (Nelson) O. E. Schulz, l. c. 176 (1927).—Greenland, Labrador and Ungava; Alberta and British Columbia, south to South Dakota and Utah. LABRADOR: Ramah, *A. Stecker*, no. 216; Hebron, *Erdmann*, no. 63 (Brit. Mus.); Okkak, *Moravian Bros.*; Port Manvers, *E. B. Delabarré*, no. 93. UNGAVA: south of Fort George, James Bay, *A. P. Low*, Herb. Geol. Surv. Can. nos. 63,145, 63,146. PLATE 296; MAP 8.

The report of *Draba aurca* from Michigan (Walpole, Papers Mich. Acad. Sci. vi. 313. 1926) was based on a fruiting specimen of *D. arabisans*.

Although it is customary in the Rocky Mountain region to consider *Draba aureiformis* Rydb. a species apart from *D. aurea* of Greenland and Labrador it would seem that those who do so have seen inadequate material of true Greenland *D. aurea* for comparison. Rydberg, in publishing it said

This species is nearest related to *D. aurea*, but characterized by the small light yellow petals [in the description "sulphur yellow, 3-4 mm. long"], the slender style ["about 1 mm. long"], the less dense pubescence, and slender stem.

Schulz, in separating it, as var. *aureiformis*, gives the same general characters, which, had he seen fuller material from the Rocky Mountains, he would have found unreliable:

Var. AUREIFORMIS: Planta saepe gracilior. Flores minores. Sepala 2-2,5 mm longa [in typical *D. aurea* "3 mm longa"]. Petala dilutiora, sulphurea, 3-4 mm longa [in *D. aurea* "aurea, 5 mm longa"]. Siliculæ . . . 7-15 mm longae, 2,5-3 mm latae, stylo brevior 0,5-1 mm longo coronatae [in *D. aurea* "1,2-1,6 cm longae, 2-3 mm latae, . . . apice stylo tenui 1-1,5 mm longo coronatae<sup>27</sup>"].

As for the more "slender" cordilleran plant, it may be pointed out that most of the Greenland plants in the Gray Herbarium have the flowering stems (1-4 dm. high) only 1-1.5 mm. in diameter at base, although the stoutest of the 61 stems of the Greenland plant before me has a maximum diameter of 3.5 mm. *Macoun's* no. 10,276 from Waterton Lake, Alberta (FIG. 3), has the stems 2-2.5 mm. thick; these measurements are repeated by the cotype of *D. uber* Nelson (a low and compact form), by *Wolfe & Rothrock's* no. 634 from Colorado,



by *Patterson's* no. 7 from Colorado, by *Goodding's* no. 1404 from Utah and by several other American specimens. Conversely, I fail to find a single cordilleran specimen "more slender" than the run of slender Greenland plants (FIGS. 1 and 2).

As for the smaller sepals (3 mm. long in the Greenland plant, 2-2.5 in the American), these measurements must have been optimistically made. 3 mm. is a good average for the Greenland specimens, but it is easy to find Greenland sepals 2.5 mm. long and not difficult to find them up to 3.5 mm. Although many American specimens have sepals only 2.5 mm. long, others show them longer: *Rydberg's* no. 516 from South Dakota, *Burke's* Rocky Mountain specimens, *Wolf & Rothrock's* no. 634 from Colorado and *J. R. Churchill's* collection of June 13, 1918 from Colorado all have them 3 mm. long; and such a beautifully prepared plant as *Patterson's* no. 7 from Gray's Peak shows many 3.2-3.3 mm. long, while *Payson & Payson's* young material, no. 5024, has them up to 3.4 mm. long. Similarly with the petals, it is not difficult to find plenty of petals of the cordilleran plant 4.5 mm. long (*Payson & Payson*, no. 5024, *Wolf & Rothrock*, no. 634, *Butters & Holway*, no. 40, etc., etc.), while a length of fully 5 mm. is easily measured in the Churchill and the Patterson specimens.

Although Schulz indicates that the siliques of the cordilleran plant are shorter (7-15 mm. long) than in the Greenland plant and that the styles are shorter, 0.5-1 mm. long, against 1-1.5 mm. in the Greenland plant, it is not without significance that the *Patterson* material so much cited and the *Macoun* plant from Waterton Lake (FIG. 3) should have siliques longer (17 mm. long) than Schulz allows for the Greenland plant; it is also important to note that the style in Greenland specimens (Upernavik, July 14, 1929, *Porsild*, our FIG. 2) may be well under 1 mm. in length, while in some cordilleran specimens (*Patterson*, no. 7, and *Butters & Holway*, no. 40) they are well over 1 mm. long.

With a residue of "sulphur yellow" against "aurea" as the specific or varietal difference between *D. auriformis* and *D. aurea* it hardly seems worth while to attempt to keep them apart. As a Greenland and Labrador plant with a large cordilleran representation, *D. aurea* is consistent and is one of a large group of species with similar disruption of range. In the cordilleran region the group has greatly segregated and we get the fairly distinguished *D. luteola* Greene

(PLATE 297, FIGS. 6 and 7), *D. surculifera* Nelson (treated by Schulz as a form of *D. aurea*), *D. spectabilis* Greene, *D. neomexicana* Greene, *D. Helleriana* Greene and *D. pinetorum* Greene. On the limestone shores of the Gulf of St. Lawrence in eastern Quebec and on the calcareous islands of James Bay the group of *D. aurea* is represented by the following localized species.

9. *D. minganensis* (Victorin), comb. nov. *Biennial or perennial*, with simple to multicapital caudex: new rosettes 1–17 cm. across; their leaves oblanceolate, entire or sparingly dentate, 0.5–9 cm. long, 1.5–17 mm. broad, green to canescent, the surfaces more or less densely covered with stalked and few-rayed irregularly stellate trichomes: flowering stems 1–very many, simple to abundantly branched, 0.4–4 dm. high, pilose-hirsute with simple, forking and stellate trichomes, leafy: cauline leaves 7–25, oblong to narrowly ovate, rounded to the sessile base, entire or dentate, 0.5–4.2 cm. long, 0.2–2 cm. broad, densely to sparsely stellate-tomentulose: racemes corymbiform in anthesis, soon loosening and becoming in fruit 3–9 cm. long, 1.5–3.5 cm. in diameter, standing well above the foliage (very rarely with 1 basal



Map 9. Range of *DRABA MINGANENSIS*.

bract), mostly 10–30-flowered: pedicels spreading to arched-ascending, with pubescence as on the stem, the lowest becoming 2–4 mm. long: sepals 2.3–3.3 mm. long, oblong to oval, the herbaceous back villous, the broad margins hyaline: petals yellow, when fresh, 3.5–5.5 mm. long, narrowly cuneate-obovate, shallowly emarginate: anthers 0.3–0.4 mm. long: ovary strongly villous-hirsute, with 30–40 ovules and definite style: siliques lanceolate to linear-oblong, usually twisted, 1–1.8 cm. long, 2–4 mm. broad, densely hirtellous with long divergent to retrorse unequally 2–3-pronged or sometimes simple trichomes mostly 0.5–1 mm. long; style 1–1.5 mm. long: seeds brown, with conspicuous black hilum, 1 mm. long.—*D. luteola* Greene, var. *minganensis* Victorin, Trans. Roy. Soc. Can. sér. iii. xxii. (Sec. v.) 174, t. iv. (1928). Local, QUEBEC: Mingan Islands, July, 1882, *Linden*; sur le cailloutis nu et les lichens, sur la Pointe entre la Petite Île et "La Montagnaise," Archipel de Mingan, 29 juillet 1926, *Victorin & Rolland*, no. 24,828

(cotype in Gray Herb.); among boulders by the St. Lawrence, north base of Cap Enragé, Bic, July 8, 1905, *Williams, Collins & Fernald* (erroneously reported as *D. borealis* DC., in *RHODORA*, vii. 267 (1905); cold limy cliffs, north side of Cap Enragé, Bic, *Fernald & Collins*, no. 577 (erroneously reported as *D. aurea* Vahl, in *RHODORA*, ix. 161 (1907)); crevices of limestone-conglomerate, north side of Cap Enragé, Bic, *Fernald & Collins*, nos. 1064, 1065; sur le conglomérat nu, au nord du Cap Enragé, Bic, *Rousseau*, no. 26,582 (reported as *D. luteola* Greene, by Victorin, l. c.); talus, north slope, and beach under Cap Original, Bic, *Fernald & Collins*, nos. 578, 579; sur les schistes émittés, Pointe sud-ouest du Cap à l'Original, Bic, *Rousseau*, no. 31,007; sandy shore, Brushy Island, James Bay, *David Potter*, no. 546; sand along freshwater creek, 2-5 miles north of The Post, Charlton Island, James Bay, *Potter*, no. 247; sand and gravel, Little Charlton Island, *J. M. Macoun*, no. 1920 (see discussion on p. 250). PLATE 297, FIGS. 1-5 and PLATE 298; MAP 9.

*Draba minganensis* belongs to the yellow-flowered and leafy group of biennials and short-lived perennials which includes *D. aurea* M. Vahl and *D. luteola* Greene, with both of which it has been identified. From *D. aurea*, as clearly pointed out by Victorin, it differs in the strictly terminal racemes and the short pedicels. *D. aurea* (PLATE 296), furthermore, has the mature (fruiting) raceme very elongate, occupying  $\frac{1}{2}$ - $\frac{4}{5}$  the entire height of the plant and, on account of the suberect pedicels, only 0.8-2.5 cm. in diameter. *D. minganensis*, with its shorter and thicker, strictly terminal racemes, with shorter and more spreading pedicels, is well separated from it, although its pubescence, especially of the siliques, is essentially the same.

Victorin left the plant of Bic (PLATES 298 and 297, FIG. 5) with the Rocky Mountain *Draba luteola* (PLATE 297, FIGS. 6 and 7) but separated from them the Mingan Island material (PLATE 297, FIGS. 1-4) as *D. luteola*, var. *minganensis*:

A typo differt: parvo habitu (4-9 mm. [cm.] long., raro 16 mm. [cm.]); caulinaribus foliis anguste ovo-lanceolatis (8-12 mm. long., 2 mm. lat.; raro 20 mm. long. et 5 mm. lat.), pubescentibus, ut caule stellaeformibus pilis densissimis longissimisque, praesertim inferius cum magnis dentibus spretis; foliis rosularibus generaliter integris.

I am unable, however, to separate on very fundamental lines the Mingan and Bic material. Most of the former (the type no.) is very small individuals (PLATE 297, FIGS. 1-3) from bare rocks and lichen-crust (one of the most sterile of habitats), conforming to Victorin's description in its low stature (4-9 cm.) and small leaves (8-12 mm. long, 2 mm. wide), but the Linden plant from the Mingans

(exact locality unknown) is better-grown and presumably from a more favorable habitat, 1.6 dm. high (very immature), with numerous branches. When fully grown it would have had considerable stature. At Bic *Draba minganensis* occurs either in the most sterile of dry gravels or in the most fertile of guano-enriched or cool and fog-moistened limy slopes and cliffs. In the driest gravel (*Fernald & Collins*, no. 578) the fully ripe fruiting plant (PLATE 297, FIG. 5) may be only 9 cm. high, with densely pubescent leaves only 5–10 mm. long. On rich and moist spots, however, it (PLATE 298) may be 4 dm. high, in the most luxuriant plants with as many as 20 freely branched flowering stems, with rosette-leaves up to 9 cm. long and 1.7 cm. broad and cauline leaves up to 4.2 cm. long and 2 cm. broad. These luxuriant plants, growing in cool and moist, highly enriched (with guano) habitats at Bic, certainly exceed in all points the starved type-material of *D. minganensis* and as a further response to their most favorable habitat their fleshy and brittle leaves have the pubescence more scattered than in the xerophytic type. The dwarf individuals (PLATE 297, FIG. 5) at Bic, however, growing in semi-arid conditions, have a stature as low, the leaves as small and the pubescence as dense as the type-collection (PLATE 297, FIGS. 1–3) from the Mingans. In many of the Bic specimens, furthermore, the cauline leaves show as appreciable toothing as in the Mingan plant, while some individuals of the latter series have nearly all the leaves entire. In the characteristic pubescence of the siliques, PLATE 298, FIGS. 2 and 3 (young in the Mingan material), and of the stems and pedicels I can find no difference. These characters seem to me more fundamental than the stature and the degree of toothing of the leaves.

Although the plant of Bic and the Mingan Islands has been placed with *D. luteola* Greene, of the Rocky Mountains, it differs from the cordilleran species in so many important characters that I cannot feel that the two are conspecific. *D. luteola*, as shown by a sheet of the type-collection and by others from the same region of Colorado (PLATE 297, FIGS. 6 and 7), has the pubescence of the entire plant very much finer than in *D. minganensis*, the stems and pedicels, as Greene correctly described them, "cinereously stellate-pubescent throughout, with only a scanty and dimly perceptible villous pubescence of simple hairs mixed with the stellate"; in *D. minganensis* the stems and pedicels are as pilose-hirsute as in *D. incana*. In *D. luteola*, as originally described, the racemes are "narrow and rather strict,"



the specimens showing them only 1.2–2 cm. in diameter (in *D. minganensis* 1.5–3.5 cm. thick); in *D. luteola* the slender and short-tomentulose lower pedicels are 4–8 mm. long (in *D. minganensis* thick, long-pubescent and only 2–4 mm. long). In *D. luteola* the siliques are pubescent with ascending to barely spreading and chiefly simple trichomes mostly less than 0.5 mm. long (in *D. minganensis* villous with divergent to retrorse mostly 2–3-pronged trichomes 0.5–1 mm. long). A habitual character, furthermore, is apparently a significant one. The primary racemes of *D. luteola* when mature make up, as in *D. aurea*, a large portion of the plant, occupying  $\frac{1}{3}$ – $\frac{2}{3}$  its full height; in *D. minganensis* the thick spike is, in maturity, only  $\frac{1}{5}$ – $\frac{2}{5}$  the full height of the stem.

The material from James Bay is both in anthesis and in fruit. It is all rather slender and with narrow leaves, but it has the pubescence of stems, leaves, pedicels and siliques which characterize *D. minganensis*. In the James Bay area alone does *D. minganensis* occur near *D. aurea*, which on the mainland near-by seems perfectly typical. For consideration of Mrs. Ekman's interpretation of *D. minganensis* as a hybrid see p. 250.

(To be continued)

## DISTRIBUTION NOTES CONCERNING CERTAIN PLANTS OF GLACIER NATIONAL PARK, MONTANA

BASSETT MAGUIRE

FROM July 15th to August 15, 1932, the writer had opportunity to make observations on and collection of plants in Glacier National Park, Montana. These notes constitute record of certain plants which seem to establish new records for or extend our knowledge of distribution of several rare or unusual plants within this area.

*EQUISETUM PALUSTRE* L.: Occurring quite commonly along the shaded banks of the outlet of Lower St. Mary Lake. Reported by Standley from Belton, on the west side of the Park.<sup>1</sup>

*EQUISETUM SYLVATICUM* L.: Found in damp woodland at the head of Two Medicine Lake.

*LARIX LYALLII* Parl.: A fine grove of this alpine larch occurs at timber line in Preston Park under the west slope of Siyeh Pass.

\**SPARGANIUM MINIMUM* Fries.: Locally abundant about a shallow pond 1 mile south of John's Lake (near Lake McDonald).

<sup>1</sup> Standley, P. C. Flora of Glacier National Park, Montana. Contr. U. S. Nat. Herb. Vol. 22, Part 5, 1921.

\*The asterisk designates those plants which seem hitherto to have been unreported from the Park.

\**POTAMOGETON FILIFORMIS* Pers.<sup>1</sup>: Common in the bays about the inlet of St. Mary Lake, and near outlet of Lower St. Mary Lake.

\**POTAMOGETON FILIFORMIS* Pers., var. *BOREALIS* (Raf.) St. John.: This pond weed is common and generally distributed in shallow lakes and pond bottoms, and slow stream beds, particularly in the Swift Current and St. Mary drainage.

\**POTAMOGETON VAGINATUS* Turcz.: Locally abundant in Lower St. Mary Lake and Lower Two Medicine Lake. These two lakes support the finest development of pond-weeds to be found in this area.

\**POTAMOGETON FRIESII* Rupr.: Common about outlet to Lower St. Mary Lake, and in pools above Lower Two Medicine Lake.

\**POTAMOGETON PANORMITANUS* Biv., var. *MINOR* Biv.: Very abundant in shallow pond near outlet to Lower St. Mary Lake, and in bays at outlet of this lake. Rare in Two Medicine Lake.

\**POTAMOGETON OBTUSIFOLIUS* Mert. & Koch.: Collected and reported common by Dr. A. S. Hazzard and Mr. Marion Madsen in Howe Lake.

*POTAMOGETON PUSILLUS* L., var. *MUCRONATUS* (Fieber) Graebner.: Common about inlet of St. Mary Lake and stream bed between Lake Josephine and Swift Current Lake.

*POTAMOGETON PUSILLUS* L. \*var. *POLYPHYLLUS* Morong. Lake Josephine.

*POTAMOGETON EPIHYDRUS* Raf., var. *NUTTALLII* (Cham. & Schlecht.) Fern.: Abundant in shallow ponds one mile south of John Lake. (According to Fernald<sup>2</sup> *P. epihydus* is reported by Standley from Glacier Park as *P. compressus* L. The writer did, however, find a floating fragment of *P. zosteriformis* Fern., the *P. compressus* of Am. Auth., in Lower St. Mary Lake. This species should be sought there.)

*POTAMOGETON TENUIFOLIUS* Raf. (*P. alpinus* of Am. Auth.): Abundant in Lower Two Medicine Lake, and common in lakes and streams of the Swift Current drainage. (This is possibly the *P. lucens* L. reported by Standley.)

*POTAMOGETON GRAMINEUS* L., var. *GRAMINIFOLIUS* Fries.: Occurs abundantly in Lower Two Medicine Lake and commonly in Lake McDonald. (The *P. heterophyllus* Schreb. of Standley's Flora of Glacier Park.)

\**POTAMOGETON PRAELONGUS* Wulf.: Sterile material was found abundantly in Lower Two Medicine Lake and in deep water of St. Mary and Lower St. Mary Lakes.

*STIPA COLUMBIANA* Macoun.: Found growing as a weed in the Public Camp at Many Glaciers.

\**POA PAUCISPICULA* Scribn. & Merr.: This arctic blue grass was found growing occasionally in more protected pockets of deeper,

<sup>1</sup> The determinations of all Potamogetons and Carices reported in this paper were kindly verified or made by the Gray Herbarium.

<sup>2</sup> Fernald, M. L. The Linear-leaved North American Species of Potamogeton, Section Axillares. Mem. Gray Herb. III, July 1932.

more moist soil on the rocky slopes of Piegan Pass, well above the timber line, at an altitude of 7300 feet.

\**POA STENANTHA* Trin.:<sup>1</sup> This interesting grass was collected along the dry, grassy, sparsely wooded north slopes near the outlet of St. Mary Lake.

\**GLYCERIA GRANDIS* S. Wats.: Growing in marshy areas near outlet of Lower St. Mary Lake.

\**BROMUS CILIATUS* L.: In meadows near outlet of Lower St. Mary Lake.

\**CAREX AQUATILIS* Wahlenb.: Growing in marsh below Two Medicine along with the abundant *C. Kelloggii* W. Boott.

\**CAREX PSEUDO-SCIRPOIDEA* Rydb.: Occurring in marshes about inlet to Grinnel Lake.

\**CAREX OEDERI* Retz., var. *PUMILA* (Cosson & Germain) Fernald.: Growing in bog at John's Lake.

*CAREX VESICARIA* L., \*var. *DISTENTA* Fries.: In marsh about Swift Current (McDermott) Lake.

\**JUNCUS NODOSUS* L.: About low lying marsh near outlet to Lower St. Mary Lake.

*TOFIELDIA PALUSTRIS* Huds.: Abundant in sphagnum bog at Preston Park.

\**SALIX MONOCHROMA* C. R. Ball?<sup>2</sup>: This small willow occurs commonly at timber line about Gunsight Lake.

*SALIX COMMUTATA* Bebb, \*var. *DENUDATA* Bebb:<sup>2</sup> Occurring commonly with the species about the shores of Gunsight Lake.

\**STELLARIA LONGIFOLIA* Muhl.:<sup>3</sup> Occurring in marsh near outlet to Lower St. Mary Lake.

\**DRABA MCCALLAE* Rydb.:<sup>4</sup> This plant was collected along shaded banks on the trail above Gunsight Lake.

*POTENTILLA PALUSTRIS* (L.) Scop.: Occurring plentifully in the marshes of Mirror Pond, above St. Mary Lake.

*CALLITRICHE PALUSTRIS* L.: Growing abundantly on mud about pond near outlet to Lower St. Mary Lake, and in marsh south of John's Lake, occurring perhaps less commonly than *C. autumnalis* L. which is found generally in the quiet waters of the Park.

*HIPPURIS VULGARIS* L.: The submerged form was found quite widely distributed in the Park; in St. Mary Lake, Lower St. Mary Lake, Swift Current Lake (McDermott Lake), Lower Two Medicine Lake, and elsewhere.

*MYRIOPHYLLUM EXALBESCENS* Fernald (*M. spicatum* L. of Standley's Flora of Glacier Park.): This aquatic also occurs generally in the waters of the Park, sometimes to a depth of 8 meters: John's Lake, Lake McDonald, Lower Two Medicine Lake, St. Mary Lake, Lower

<sup>1</sup> Identified by Dr. A. S. Hitchcock.

<sup>2</sup> Determined by Dr. C. R. Ball.

<sup>3</sup> Verified by Dr. K. M. Wiegand.

<sup>4</sup> Dr. K. M. Wiegand kindly compared this collection with a duplicate type deposited at the Cornell Herbarium.



St. Mary Lake, Flat Top Lake, Swift Current Ridge Lake (Bath Tub), and a small pond near Many Glaciers Hotel.

*ECHINOPANAX HORRIDUM* (J. E. Smith) Decaisne & Planch.: This handsome shrub was observed commonly along the woodland trail to Gunsight Lake (not collected).

*CORNUS CANADENSIS* L.: Growing in the woodland about Mirror Pond, above St. Mary Lake.

\**STEIRONEMA CILIATUM* (L.) Raf.: Found abundantly in swampy woodland about outlet, Lower St. Mary Lake.

\**SCUTELLARIA EPILOBIIFOLIA* Hamilt. (*S. galericulata* of Am. Auth.): Locally common in marshes south of John's Lake.

*LIMOSELLA AQUATICA* L.: This delicate little mud plant was found abundantly along the banks of Swift Current Creek, near its passage into Lake Sherburne.

*VIBURNUM PAUCIFLORUM* Pylaie.: Occurring in thickets on the sand beaches, inlet of St. Mary Lake.

\**SOLIDAGO DILATATA* A. Nels.:<sup>10</sup> Occurring on banks in the vicinity of Many Glaciers Checking Station.

\**SOLIDAGO SCOPULORUM* (Gray) A. Nels.:<sup>1</sup> The alpine form was collected in the meadows above Cracker Lake, and on rocky slopes at Piegan Pass.

*ARNICA DIVERSIFOLIA* Greene: Is splendidly developed in the woods, margin about Lake Josephine. Here and particularly in meadows about Elrod Lake is an exceedingly interesting form of the *Diversifolia* group which is not placeable in the above species.

The Section *Alpinae* of the Genus *Arnica* seems to be particularly well developed in the higher regions of the Park, yielding many varied forms which should be given more intensive field studies. There occurs here abundantly *A. alpina* of Am. Auth. (which is possibly not *A. alpina* (L.) Olin on the authority of Dr. Aven Nelson). About timber line occurs a plant referable to *A. Rydbergii* Greene, and in the rocky slopes at Piegan Pass (7500 ft.) was found a beautiful little member of this group which seemingly is not referable to any of the known species from North West America.

Mention here may possibly be made of a fine, large-leaved *Arnica*, probably of the *Foliosae* group, found in the low-lying swampy woodland at the outlet end of Lower St. Mary.

Unless otherwise noted, all specimens recorded in this paper are on deposit in the Herbarium of the Utah State Agriculture College.

UTAH STATE AGRICULTURE COLLEGE,  
Logan.

Volume 36, no. 427, including pages 241-268, was issued 2 July, 1934.

<sup>1</sup> Determined by Dr. Aven Nelson.



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